OIPE IAP74
SEP 21 2006
PATENT & TRADEMARK OFFICE

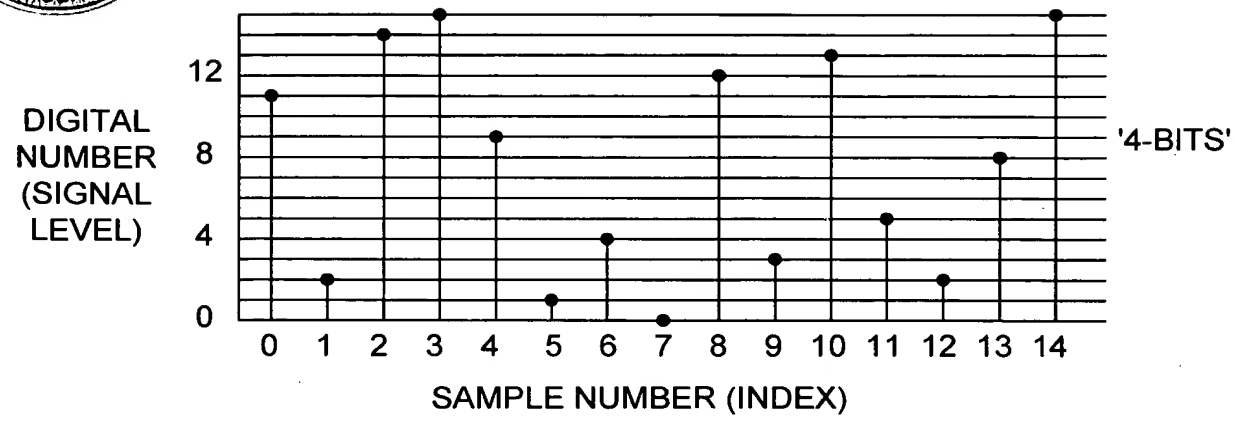


FIG. 1

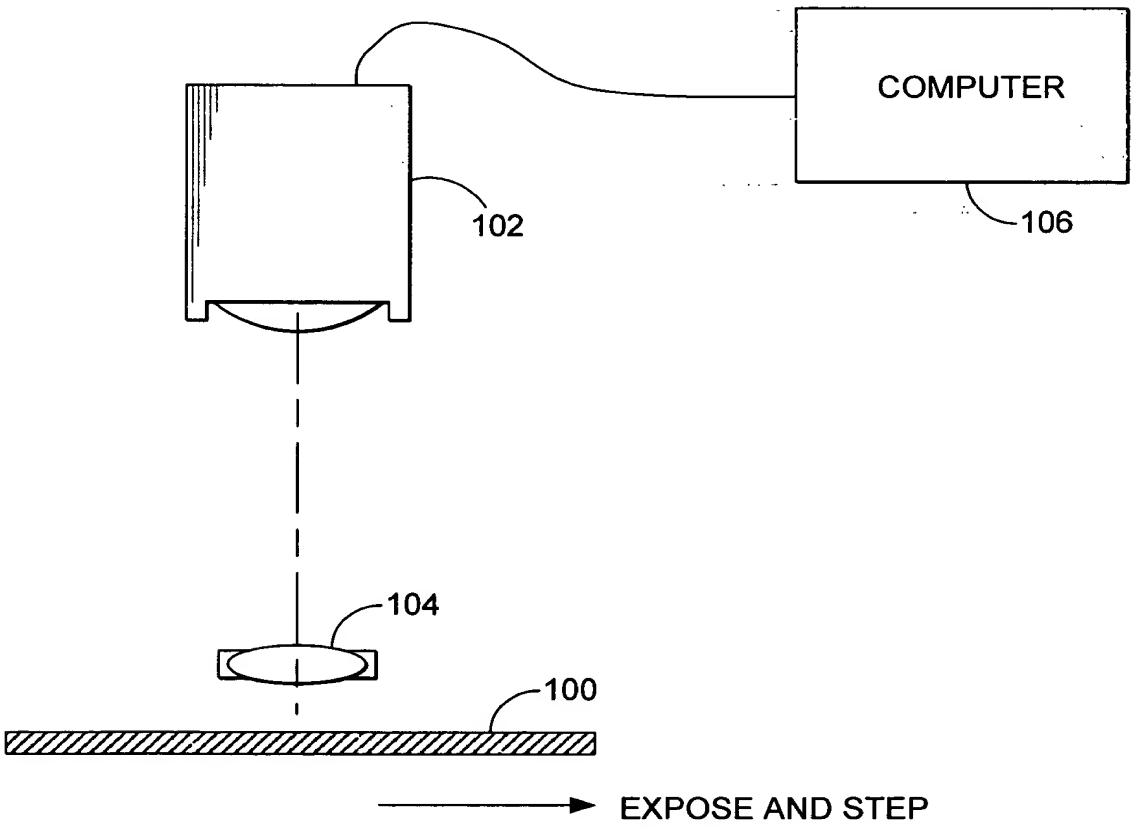


FIG. 4

FIG. 2

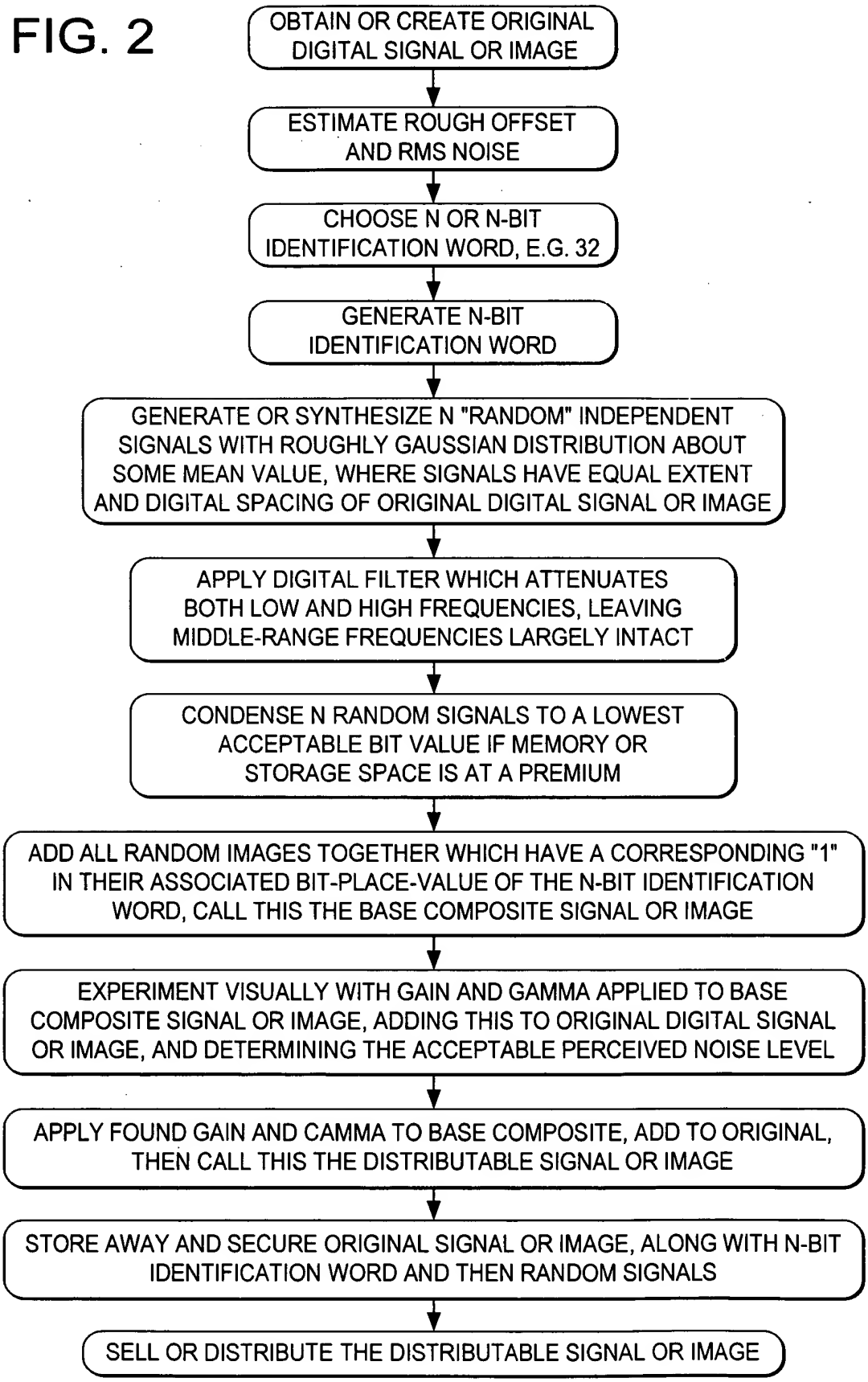
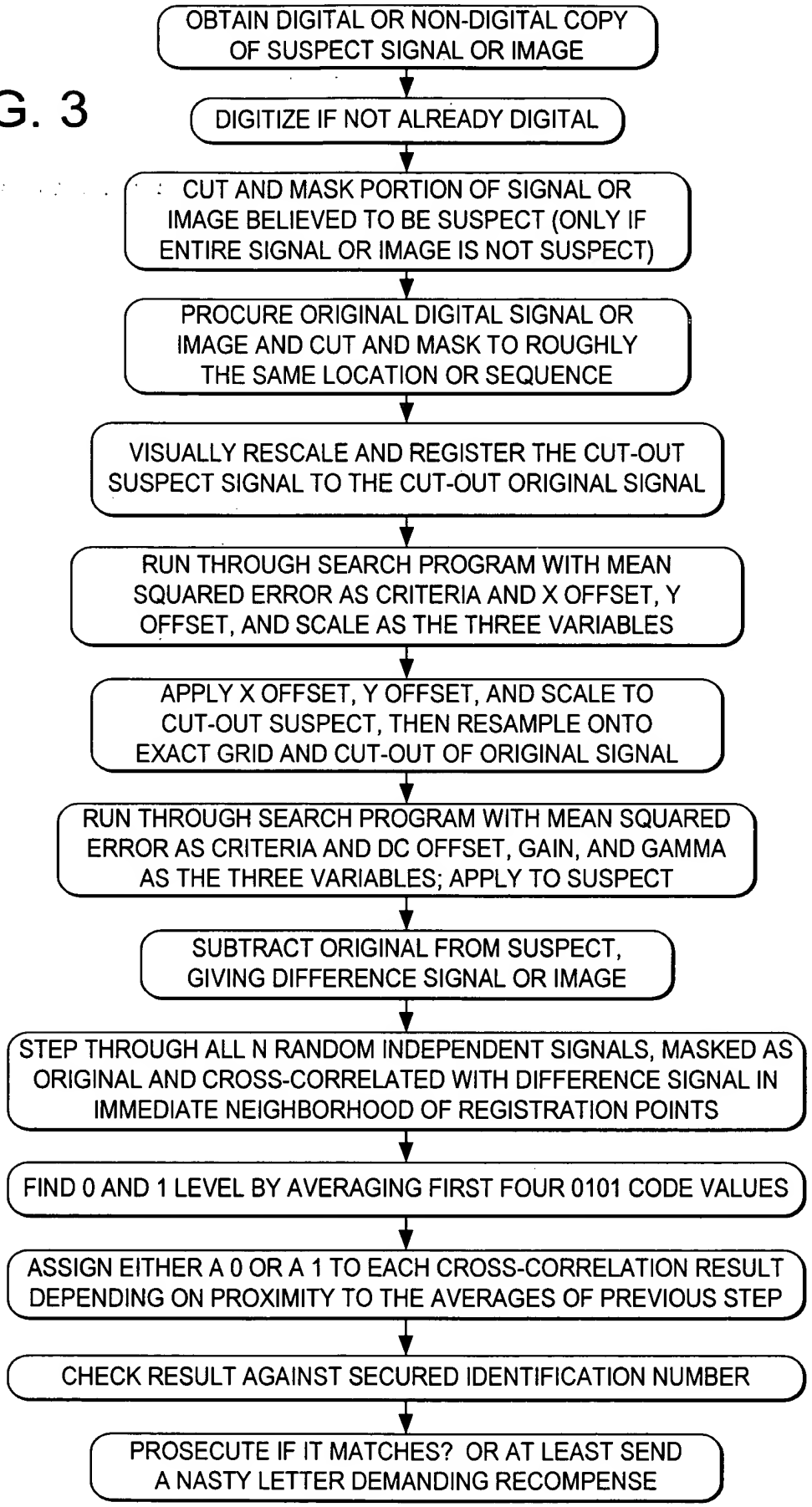

OBTAIN OR CREATE ORIGINAL DIGITAL SIGNAL OR IMAGE
ESTIMATE ROUGH OFFSET AND RMS NOISE
CHOOSE N OR N-BIT IDENTIFICATION WORD, E.G. 32
GENERATE N-BIT IDENTIFICATION WORD
GENERATE OR SYNTHESIZE N "RANDOM" INDEPENDENT SIGNALS WITH ROUGHLY GAUSSIAN DISTRIBUTION ABOUT SOME MEAN VALUE, WHERE SIGNALS HAVE EQUAL EXTENT AND DIGITAL SPACING OF ORIGINAL DIGITAL SIGNAL OR IMAGE
APPLY DIGITAL FILTER WHICH ATTENUATES BOTH LOW AND HIGH FREQUENCIES, LEAVING MIDDLE-RANGE FREQUENCIES LARGELY INTACT
CONDENSE N RANDOM SIGNALS TO A LOWEST ACCEPTABLE BIT VALUE IF MEMORY OR STORAGE SPACE IS AT A PREMIUM
ADD ALL RANDOM IMAGES TOGETHER WHICH HAVE A CORRESPONDING "1" IN THEIR ASSOCIATED BIT-PLACE-VALUE OF THE N-BIT IDENTIFICATION WORD, CALL THIS THE BASE COMPOSITE SIGNAL OR IMAGE
EXPERIMENT VISUALLY WITH GAIN AND GAMMA APPLIED TO BASE COMPOSITE SIGNAL OR IMAGE, ADDING THIS TO ORIGINAL DIGITAL SIGNAL OR IMAGE, AND DETERMINING THE ACCEPTABLE PERCEIVED NOISE LEVEL
APPLY FOUND GAIN AND CAMMA TO BASE COMPOSITE, ADD TO ORIGINAL, THEN CALL THIS THE DISTRIBUTABLE SIGNAL OR IMAGE
STORE AWAY AND SECURE ORIGINAL SIGNAL OR IMAGE, ALONG WITH N-BIT IDENTIFICATION WORD AND THEN RANDOM SIGNALS
SELL OR DISTRIBUTE THE DISTRIBUTABLE SIGNAL OR IMAGE

FIG. 3


OBTAIN DIGITAL OR NON-DIGITAL COPY OF SUSPECT SIGNAL OR IMAGE
DIGITIZE IF NOT ALREADY DIGITAL
CUT AND MASK PORTION OF SIGNAL OR IMAGE BELIEVED TO BE SUSPECT (ONLY IF ENTIRE SIGNAL OR IMAGE IS NOT SUSPECT)
PROCURE ORIGINAL DIGITAL SIGNAL OR IMAGE AND CUT AND MASK TO ROUGHLY THE SAME LOCATION OR SEQUENCE
VISUALLY RESCALE AND REGISTER THE CUT-OUT SUSPECT SIGNAL TO THE CUT-OUT ORIGINAL SIGNAL
RUN THROUGH SEARCH PROGRAM WITH MEAN SQUARED ERROR AS CRITERIA AND X OFFSET, Y OFFSET, AND SCALE AS THE THREE VARIABLES
APPLY X OFFSET, Y OFFSET, AND SCALE TO CUT-OUT SUSPECT, THEN RESAMPLE ONTO EXACT GRID AND CUT-OUT OF ORIGINAL SIGNAL
RUN THROUGH SEARCH PROGRAM WITH MEAN SQUARED ERROR AS CRITERIA AND DC OFFSET, GAIN, AND GAMMA AS THE THREE VARIABLES; APPLY TO SUSPECT
SUBTRACT ORIGINAL FROM SUSPECT, GIVING DIFFERENCE SIGNAL OR IMAGE
STEP THROUGH ALL N RANDOM INDEPENDENT SIGNALS, MASKED AS ORIGINAL AND CROSS-CORRELATED WITH DIFFERENCE SIGNAL IN IMMEDIATE NEIGHBORHOOD OF REGISTRATION POINTS
FIND 0 AND 1 LEVEL BY AVERAGING FIRST FOUR 0101 CODE VALUES
ASSIGN EITHER A 0 OR A 1 TO EACH CROSS-CORRELATION RESULT DEPENDING ON PROXIMITY TO THE AVERAGES OF PREVIOUS STEP
CHECK RESULT AGAINST SECURED IDENTIFICATION NUMBER
PROSECUTE IF IT MATCHES? OR AT LEAST SEND A NASTY LETTER DEMANDING RECOMPENSE

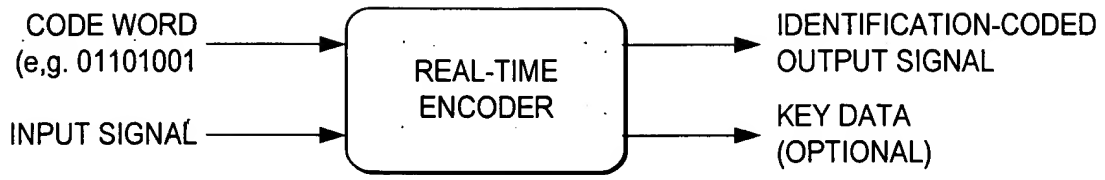

CODE WORD
(e,g. 01101001
INPUT SIGNAL
REAL-TIME
ENCODER
IDENTIFICATION-CODED
OUTPUT SIGNAL
KEY DATA
(OPTIONAL)

FIG. 5

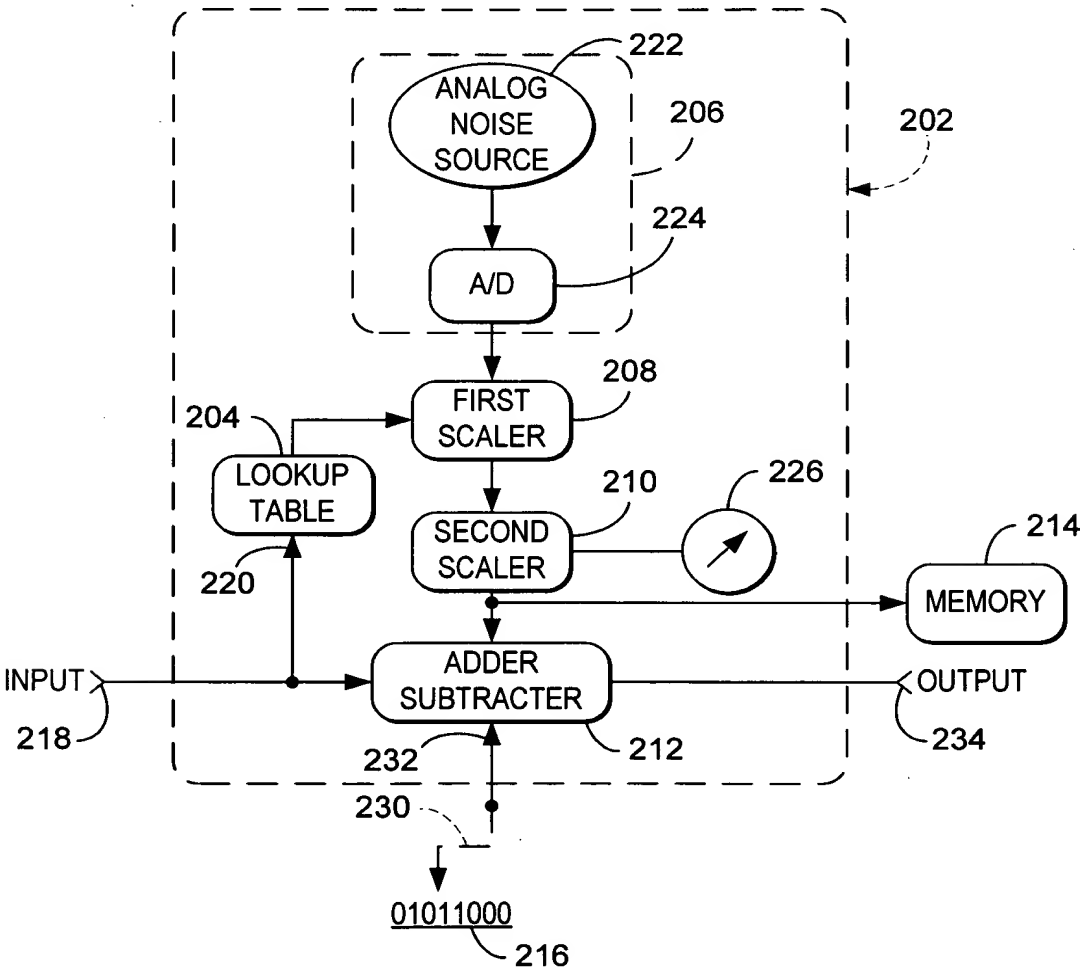

222
ANALOG
NOISE
SOURCE
206
202
224
A/D
208
204
FIRST
SCALER
LOOKUP
TABLE
210
226
SECOND
SCALER
214
MEMORY
220
INPUT
ADDER
SUBTRACTER
OUTPUT
218
212
234
232
230
01011000
216

FIG. 6

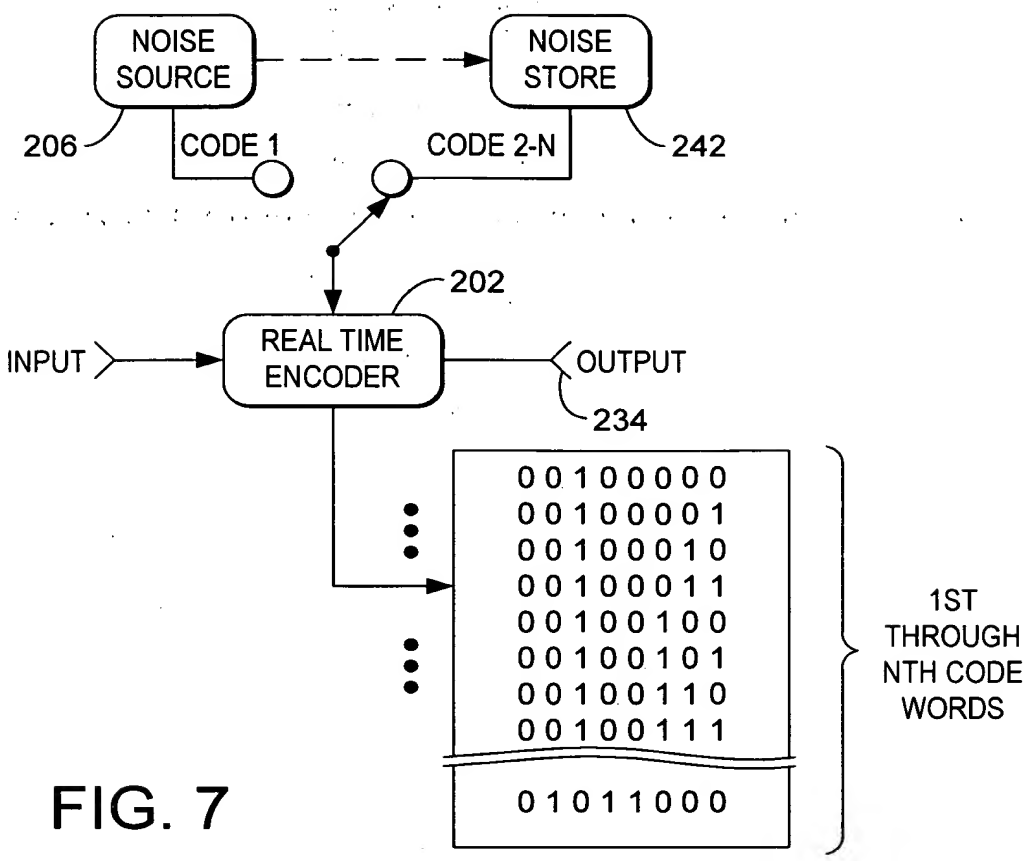

NOISE SOURCE
NOISE STORE
206
CODE 1
CODE 2-N
242
202
INPUT
REAL TIME ENCODER
OUTPUT
234
0 0 1 0 0 0 0 0
0 0 1 0 0 0 0 1
0 0 1 0 0 0 1 0
0 0 1 0 0 0 1 1
0 0 1 0 0 1 0 0
0 0 1 0 0 1 0 1
0 0 1 0 0 1 1 0
0 0 1 0 0 1 1 1
0 1 0 1 1 0 0 0
1ST THROUGH NTH CODE WORDS

FIG. 7

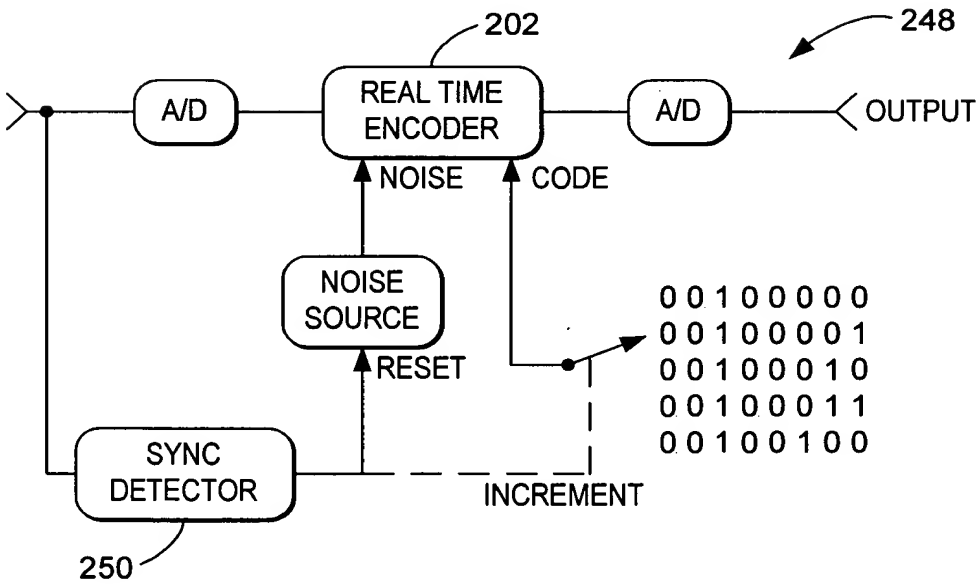

202
248
A/D
REAL TIME ENCODER
A/D
OUTPUT
NOISE
CODE
NOISE SOURCE
RESET
0 0 1 0 0 0 0 0
0 0 1 0 0 0 0 1
0 0 1 0 0 0 1 0
0 0 1 0 0 0 1 1
0 0 1 0 0 1 0 0
SYNC DETECTOR
INCREMENT
250

FIG. 8

FIG. 9A

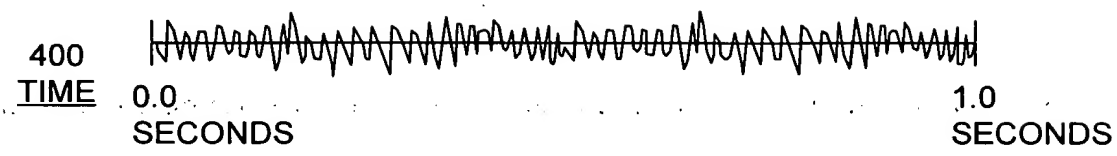


FIG. 9B

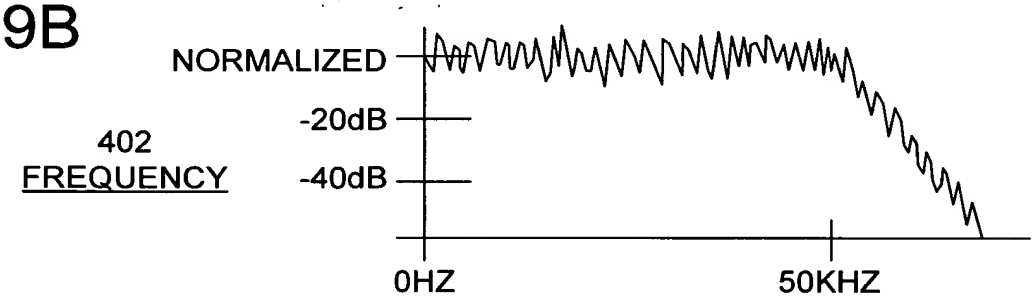


FIG. 9C

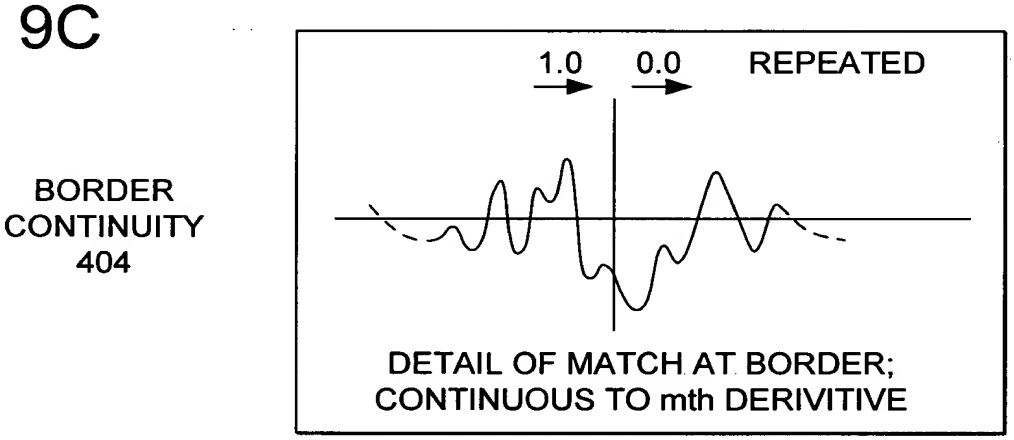


FIG. 10

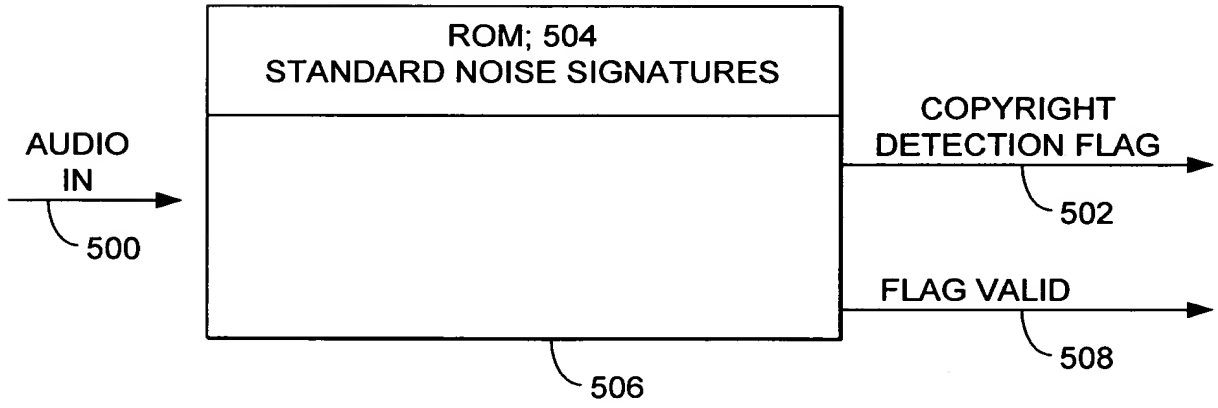


FIG. 11

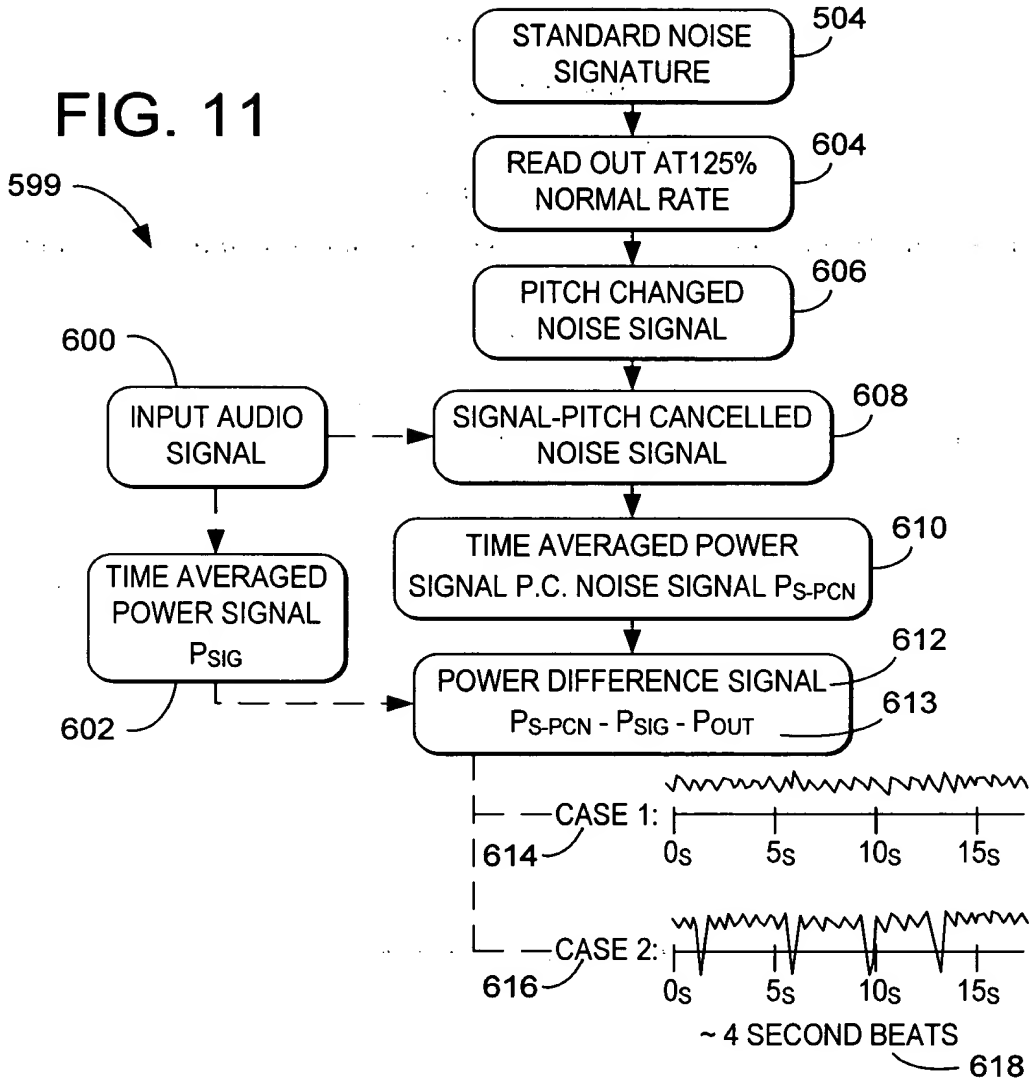
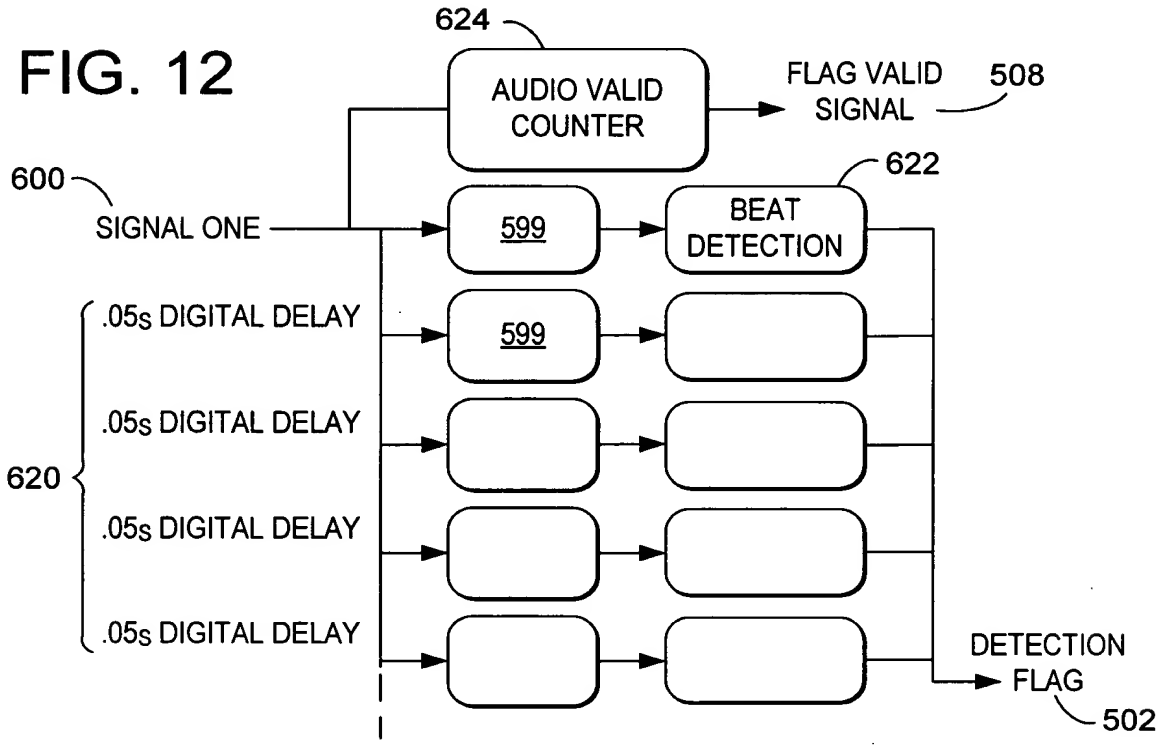
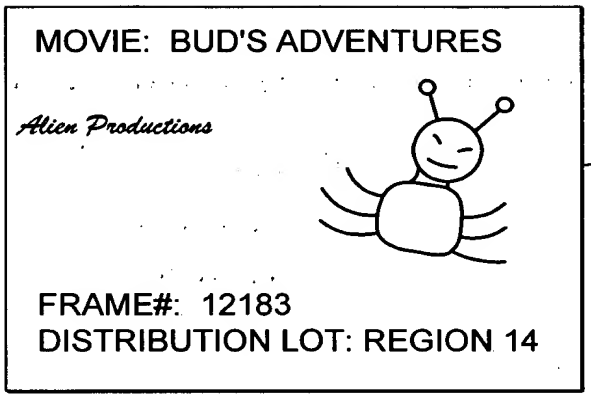
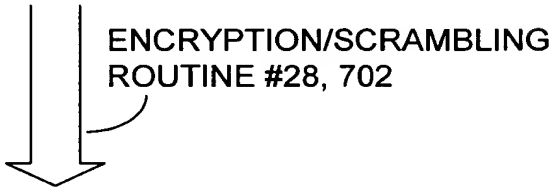
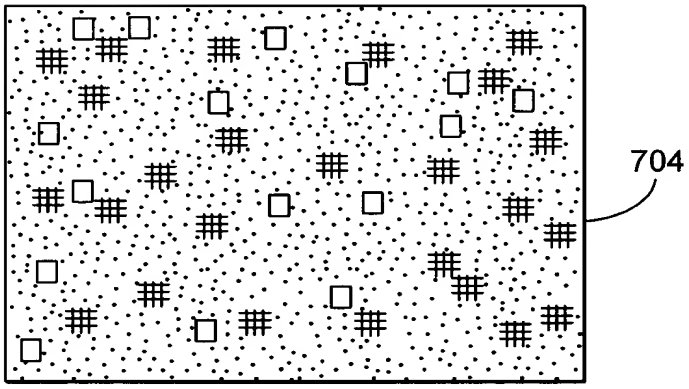

599
STANDARD NOISE SIGNATURE
504
READ OUT AT125% NORMAL RATE
604
PITCH CHANGED NOISE SIGNAL
606
600
INPUT AUDIO SIGNAL
SIGNAL-PITCH CANCELLED NOISE SIGNAL
608
TIME AVERAGED POWER SIGNAL P.C. NOISE SIGNAL PS-PCN
610
TIME AVERAGED POWER SIGNAL PSIG
602
POWER DIFFERENCE SIGNAL PS-PCN - PSIG - POUT
612
613
CASE 1:
614
0S
5S
10S
15S
CASE 2:
616
0S
5S
10S
15S
~ 4 SECOND BEATS
618

FIG. 12


624
AUDIO VALID COUNTER
FLAG VALID SIGNAL
508
600
SIGNAL ONE
622
599
BEAT DETECTION
.05S DIGITAL DELAY
599
.05S DIGITAL DELAY
620
.05S DIGITAL DELAY
.05S DIGITAL DELAY
DETECTION FLAG
502







PSEUDO-RANDOM MASTER SNOWY IMAGE
(SCALED DOWN AND ADDED TO FRAME 12183)

FIG. 13

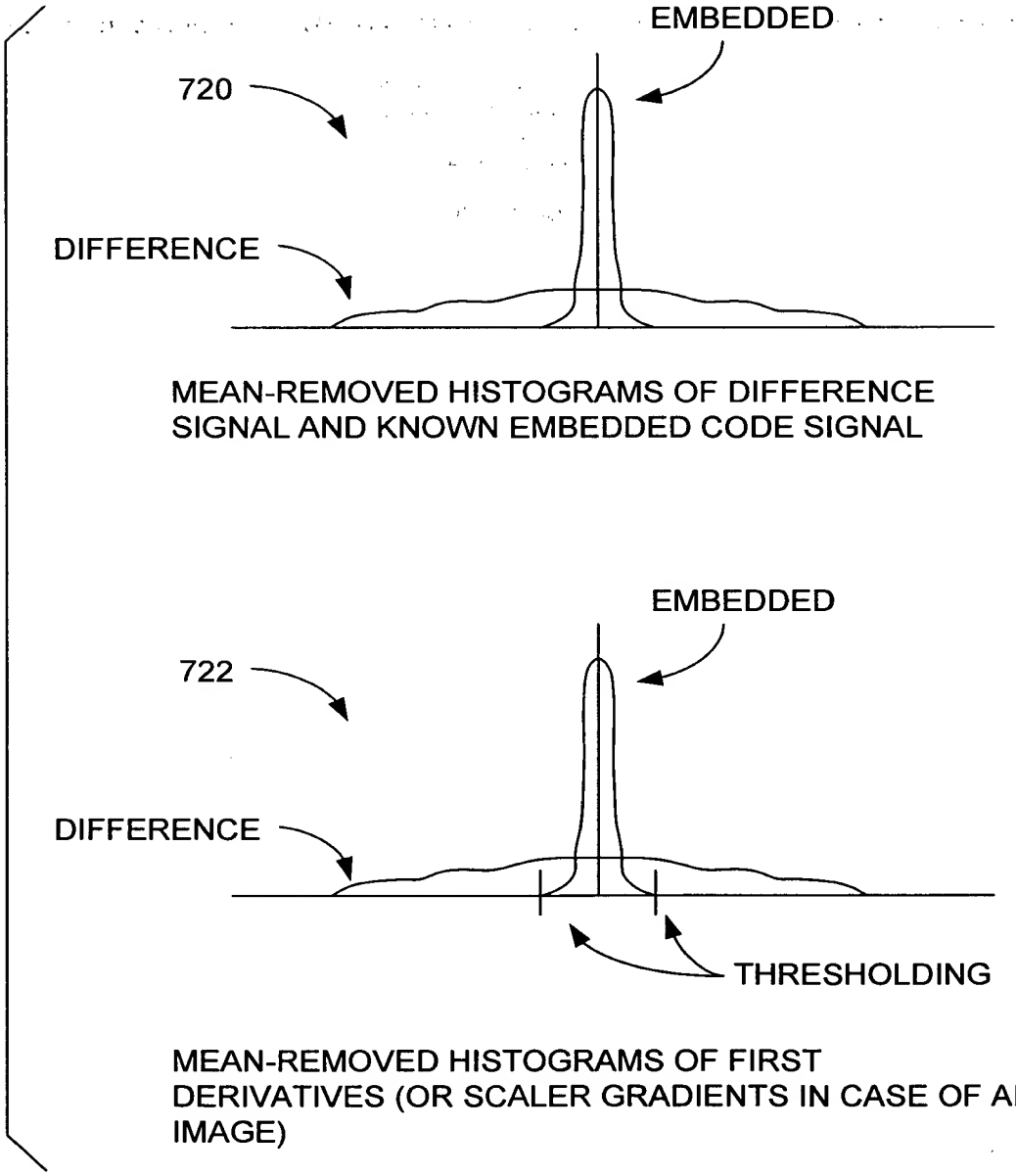

EMBEDDED
720
DIFFERENCE
MEAN-REMOVED HISTOGRAMS OF DIFFERENCE SIGNAL AND KNOWN EMBEDDED CODE SIGNAL
EMBEDDED
722
DIFFERENCE
THRESHOLDING
MEAN-REMOVED HISTOGRAMS OF FIRST DERIVATIVES (OR SCALER GRADIENTS IN CASE OF AN IMAGE)

FIG. 14

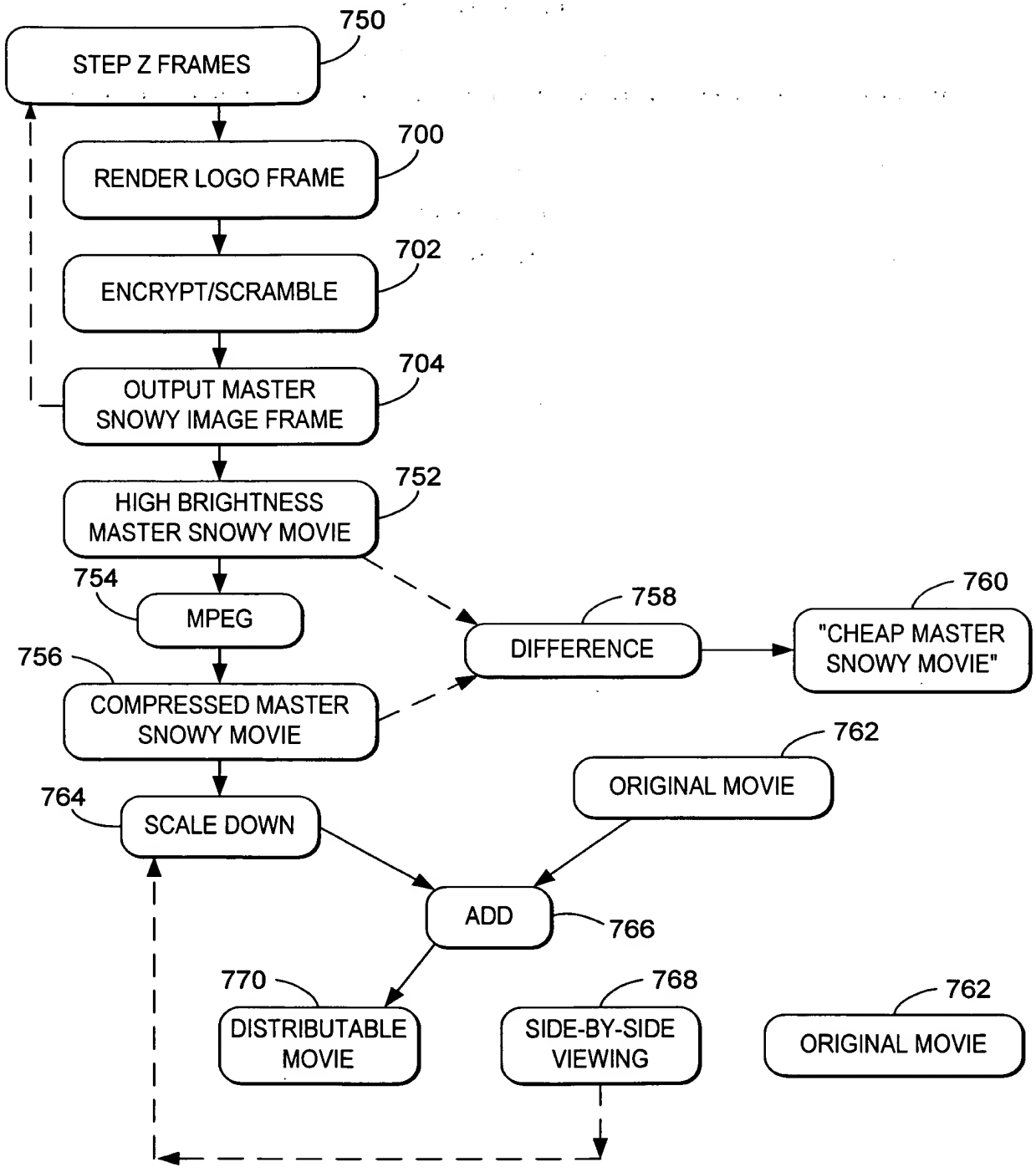

750
STEP Z FRAMES
700
RENDER LOGO FRAME
702
ENCRYPT/SCRAMBLE
704
OUTPUT MASTER SNOWY IMAGE FRAME
752
HIGH BRIGHTNESS MASTER SNOWY MOVIE
754
MPEG
756
COMPRESSED MASTER SNOWY MOVIE
758
DIFFERENCE
760
"CHEAP MASTER SNOWY MOVIE"
762
ORIGINAL MOVIE
764
SCALE DOWN
ADD
766
770
DISTRIBUTABLE MOVIE
768
SIDE-BY-SIDE VIEWING
762
ORIGINAL MOVIE

FIG. 15

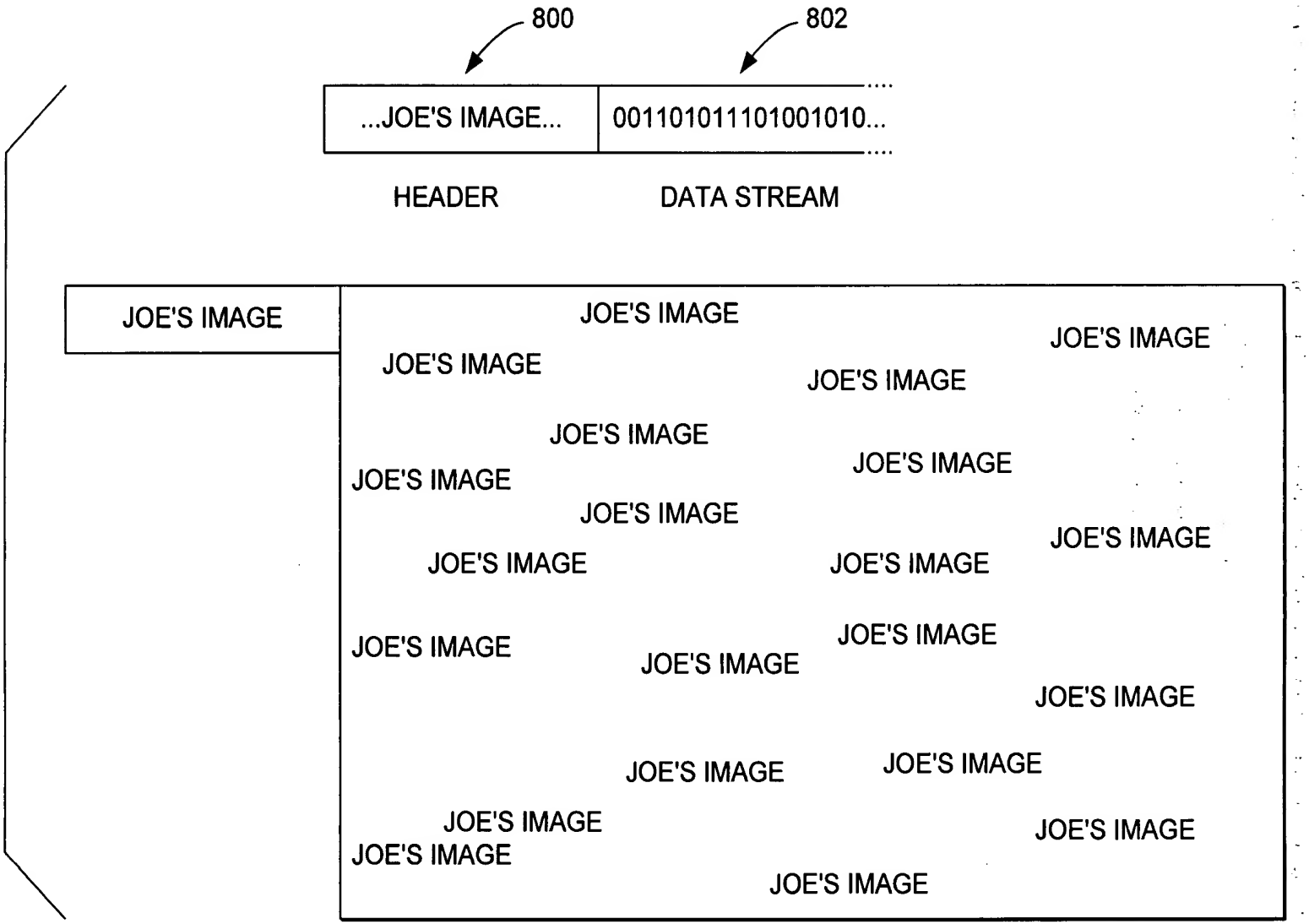

800
802
...JOE'S IMAGE...
001101011101001010...
HEADER
DATA STREAM
JOE'S IMAGE
JOE'S IMAGE
JOE'S IMAGE
JOE'S IMAGE
JOE'S IMAGE
JOE'S IMAGE
JOE'S IMAGE
JOE'S IMAGE
JOE'S IMAGE
JOE'S IMAGE
JOE'S IMAGE
JOE'S IMAGE
JOE'S IMAGE
JOE'S IMAGE
JOE'S IMAGE
JOE'S IMAGE
JOE'S IMAGE
JOE'S IMAGE
JOE'S IMAGE
JOE'S IMAGE
JOE'S IMAGE
JOE'S IMAGE

FIG. 16

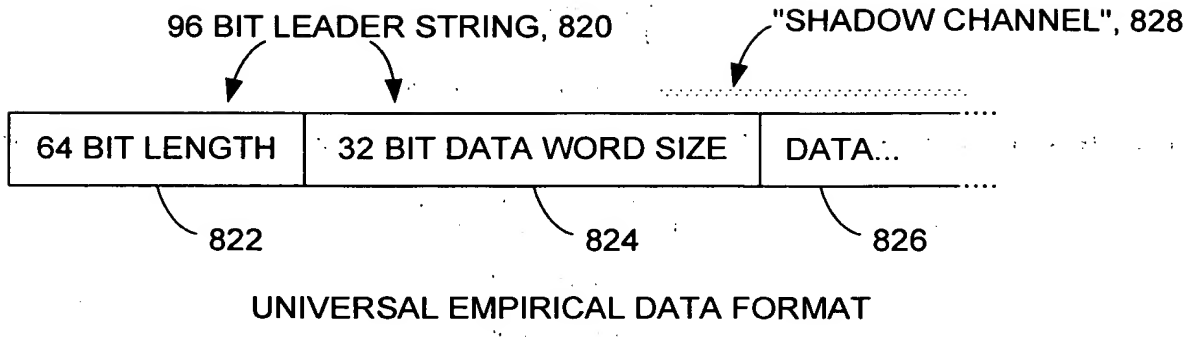

96 BIT LEADER STRING, 820
"SHADOW CHANNEL", 828
64 BIT LENGTH
32 BIT DATA WORD SIZE
DATA...
822
824
826
UNIVERSAL EMPIRICAL DATA FORMAT

FIG. 17

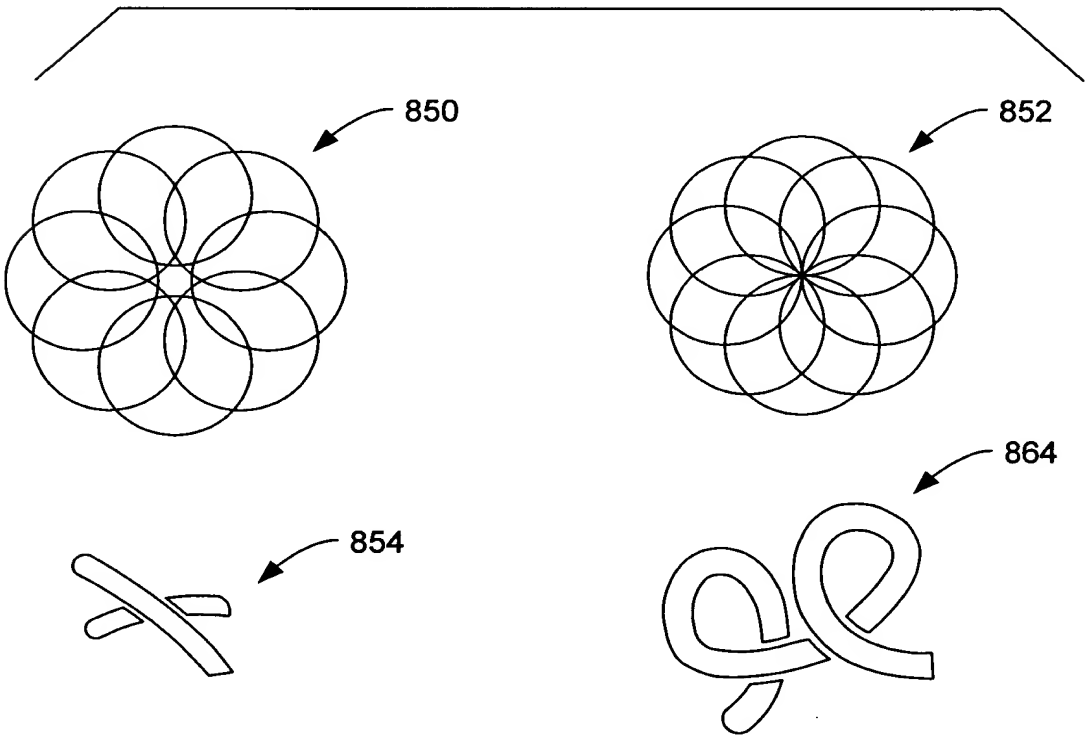
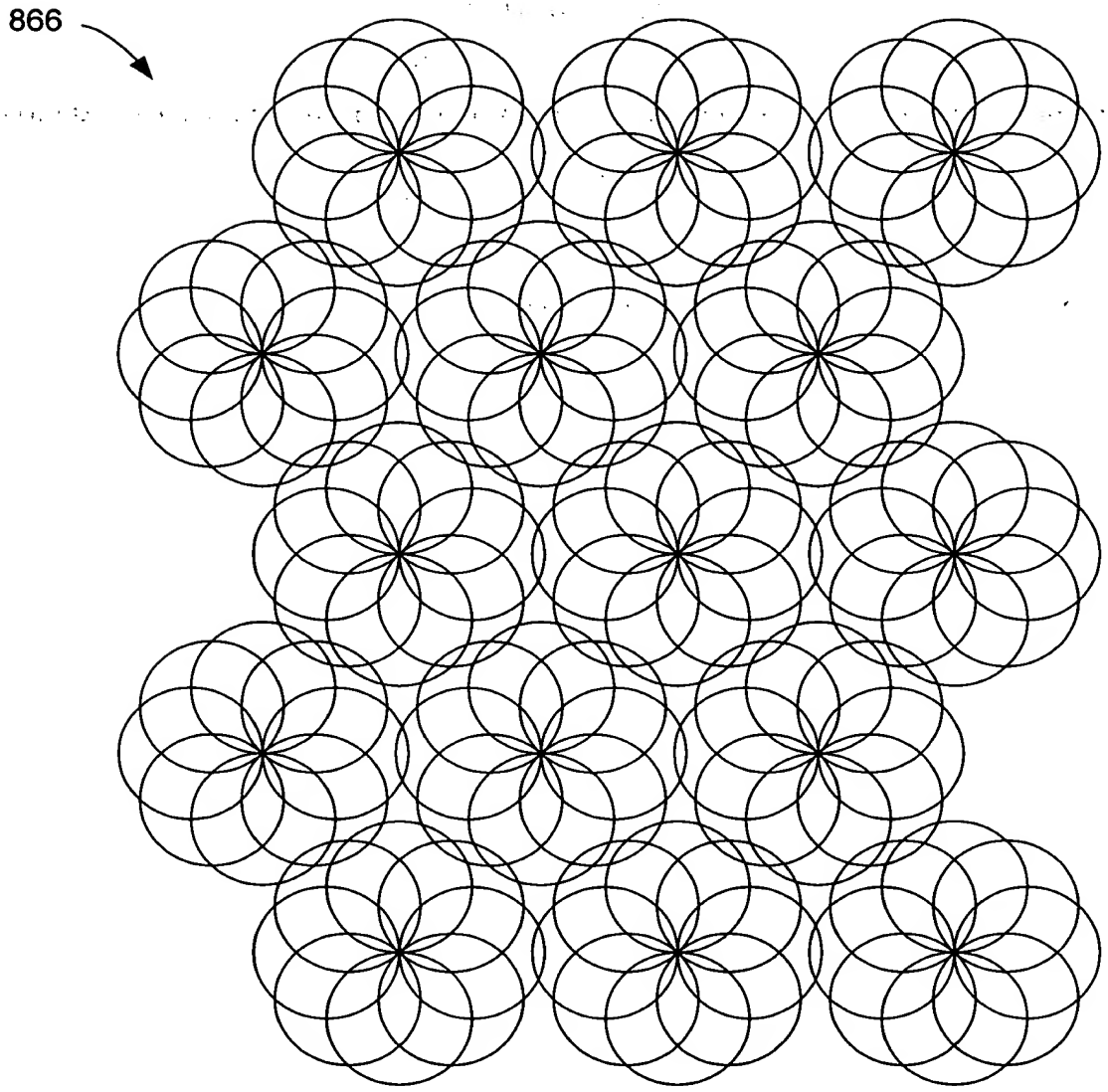
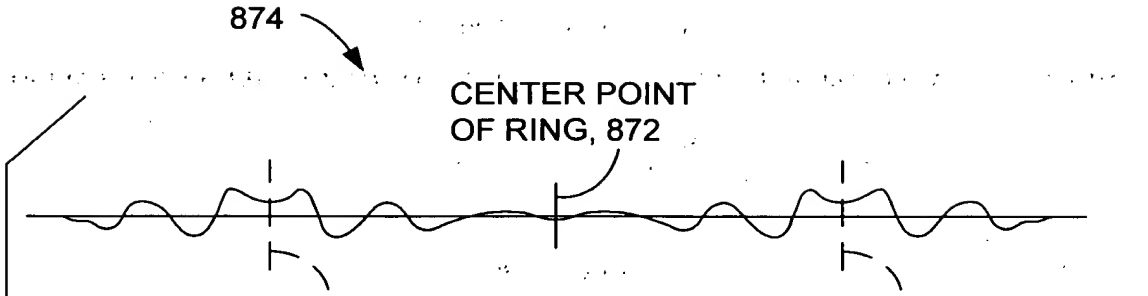

850
852
854
864

FIG. 18



QUEST FOR MOSAICED KNOT PATTERNS WHICH "COVER" AND ARE COEXTENSIVE WITH ORIGINAL IMAGE; ALL ELEMENTAL KNOT PATTERNS CAN CONVEY THE SAME INFORMATION, SUCH AS A SIGNATURE, OR EACH CAN CONVEY A NEW MESSAGE IN A STEGANOGAPHIC SENSE

FIG. 19



2-D BRIGHTNESS OF PHASE-ONLY FILTERED RING IS SIMILAR TO THE ABOVE BRIGHTNESS PATTERN ROTATED ABOUT CENTRAL POINT OF RING:

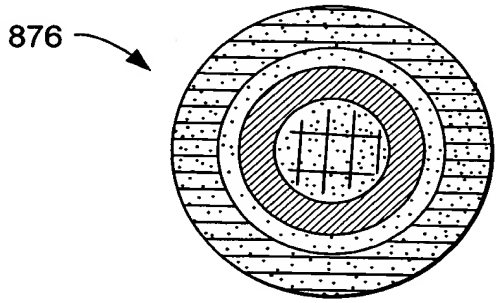
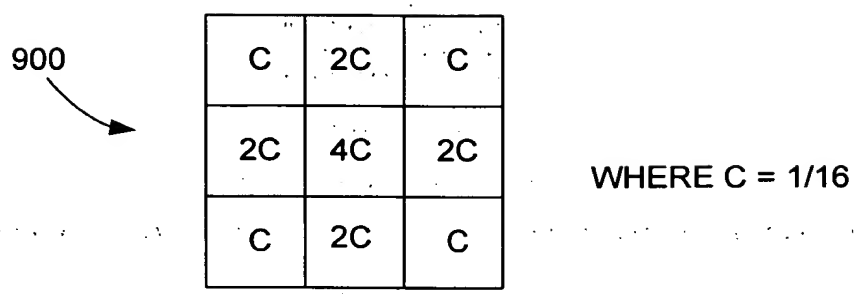
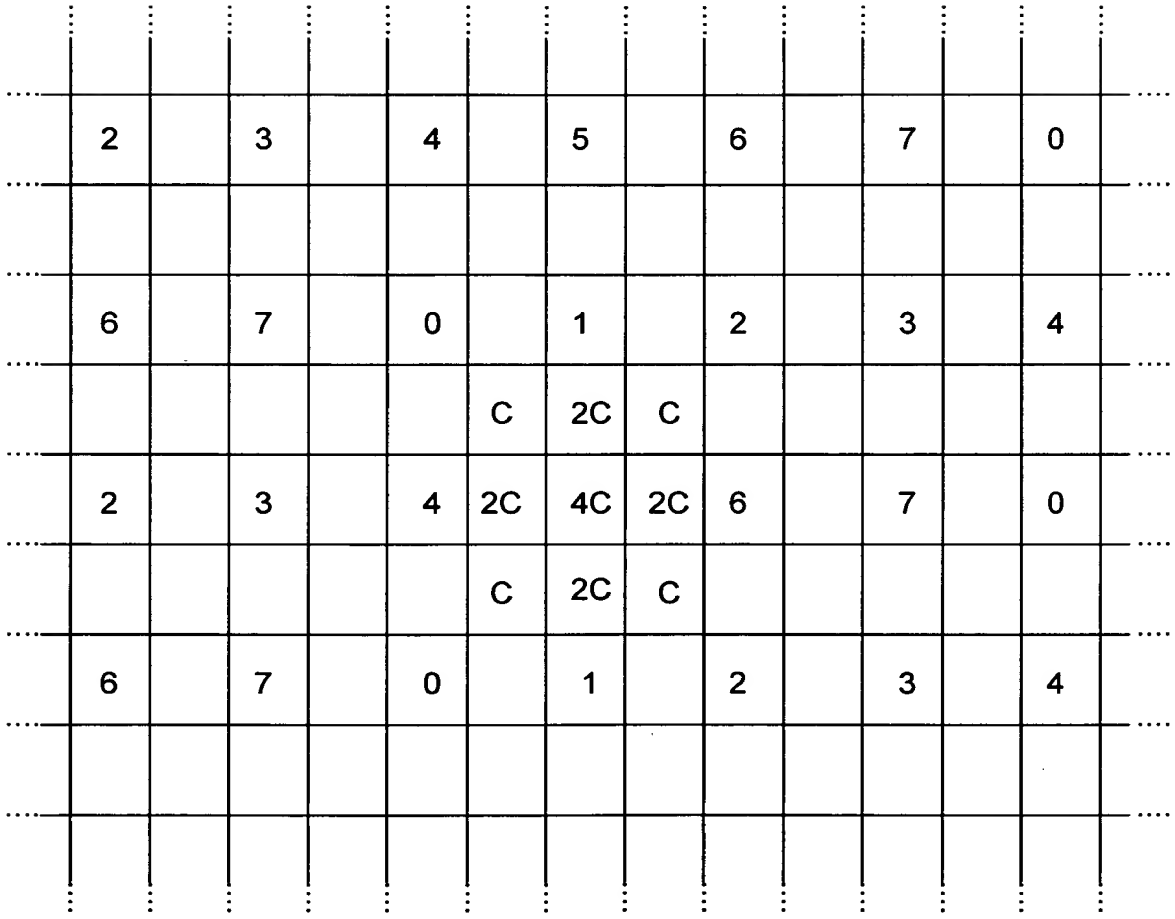


FIG. 20



ELEMENTARY BUMP (DEFINED GROUPING OF PIXELS WITH WEIGHT VALUES)

FIG. 21A



EXAMPLE OF HOW MANY ELEMENTARY BUMPS, 900, WOULD BE ASSIGNED LOCATIONS IN AN IMAGE, AND THOSE LOCATIONS WOULD BE ASSOCIATED WITH A CORRESPONDING BIT PLANE IN THE N-BIT WORD, HERE TAKEN AS N=8 WITH INDEXES OF 0-7. ONE LOCATION, ASSOCIATED WITH BIT PLANE "5", HAS THE OVERLAY OF THE BUMP PROFILE DEPICTED.

FIG. 21B

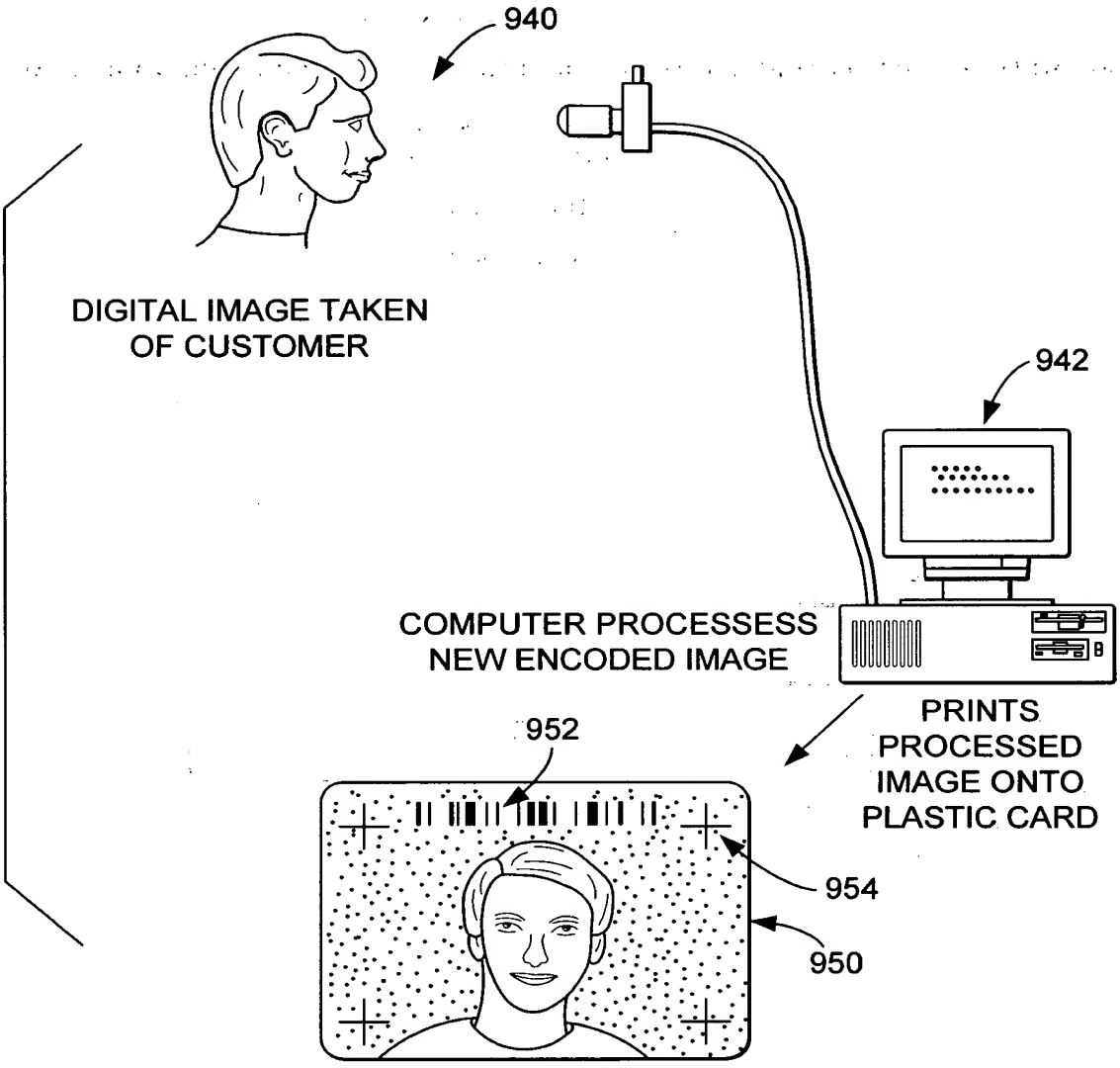
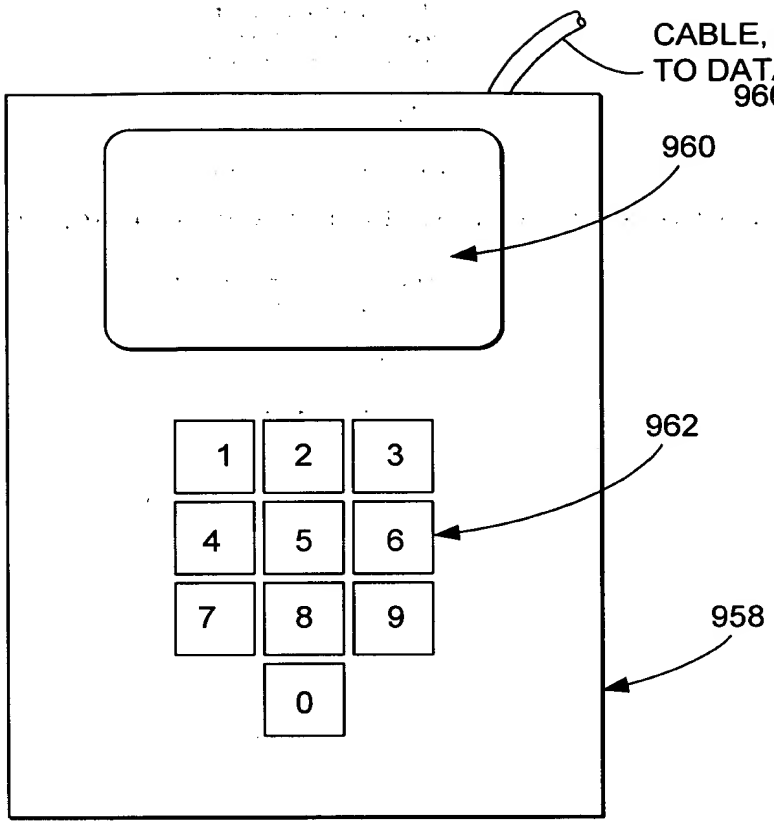

940
DIGITAL IMAGE TAKEN
OF CUSTOMER
942
COMPUTER PROCESSESS
NEW ENCODED IMAGE
PRINTS
PROCESSED
IMAGE ONTO
PLASTIC CARD
952
954
950

FIG. 22



CONTAINS RUDIMENTARY OPTICAL SCANNER, MEMORY BUFFERS, COMMUNICATIONS DEVICES, AND MICROPROCESSOR

CONSUMER MERELY PLACES CARD INTO WINDOW AND CAN, AT THEIR PREARRANGED OPTION, EITHER TYPE IN A PERSONAL IDENTIFICATION NUMBER (PIN, FOR ADDED SECURITY) OR NOT. THE TRANSACTION IS APPROVED OR DISAPPROVED WITHIN SECONDS.

FIG. 23

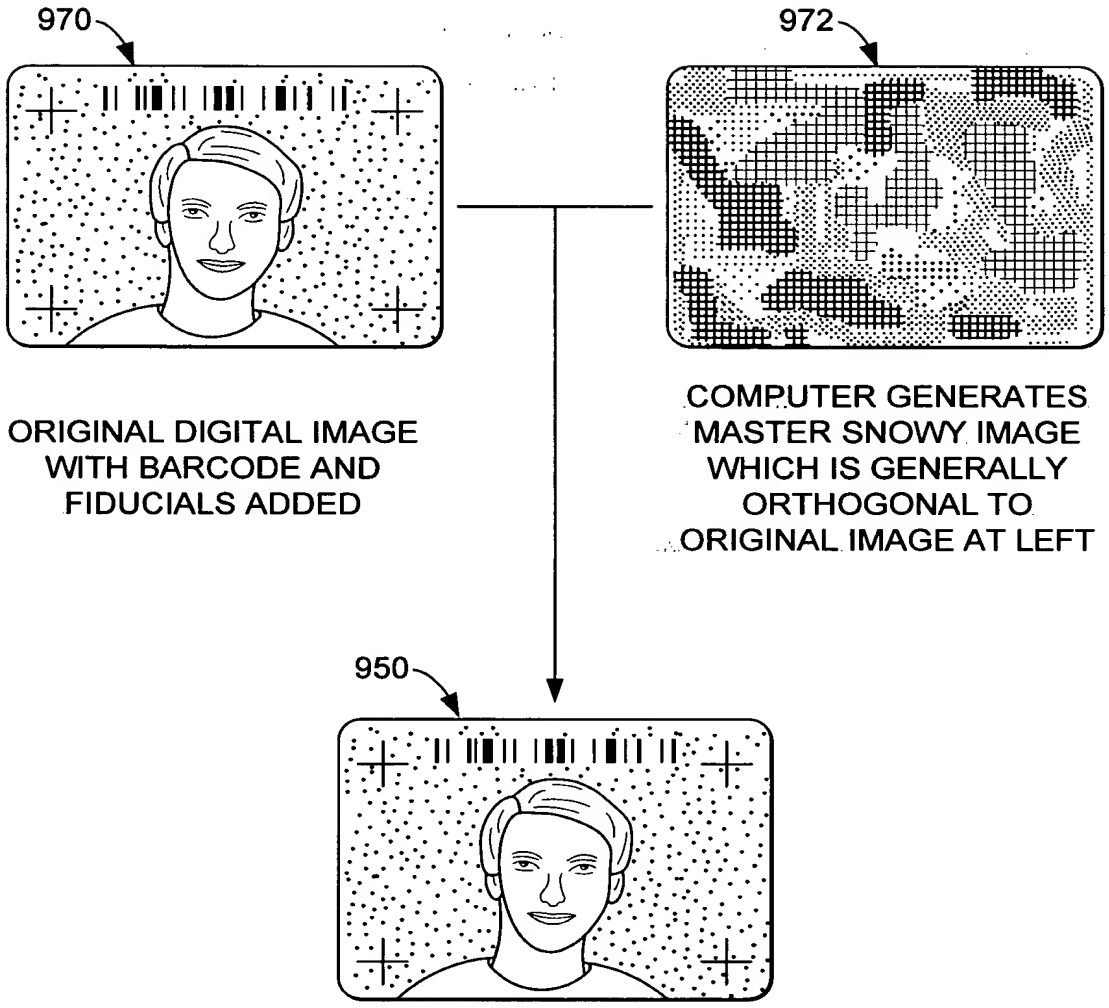

970
972
ORIGINAL DIGITAL IMAGE WITH BARCODE AND FIDUCIALS ADDED
COMPUTER GENERATES MASTER SNOWY IMAGE WHICH IS GENERALLY ORTHOGONAL TO ORIGINAL IMAGE AT LEFT
950
COMBINED TO FORM PERSONAL CASH CARD

FIG. 24

TYPICAL TRANSACTION STEPS

1. READER SCANS IMAGE ON CARD, STORES IN MEMORY, EXTRACTS PERSON'S ID
2. OPTIONAL: USER KEYS IN PIN NUMBER
3. READER CALLS CENTRAL ACCOUNT DATA NETWORK, HANDSHAKES
4. READER SENDS ID, (PIN), MERCHANT INFORMATION, AND REQUESTED TRANSACTION AMOUNT TO CENTRAL NETWORK
5. CENTRAL NETWORK VERIFIES ID, PIN, MERCHANT INFO, AND ACCOUNT BALANCE
6. IF OK, CENTRAL NETWORK GENERATES TWENTY-FOUR SETS OF SIXTEEN DISTINCT RANDOM NUMBERS, WHERE THE RANDOM NUMBERS ARE INDEXES TO A SET OF 64K ORTHOGONAL SPATIAL PATTERNS
7. CENTRAL NETWORK TRANSMITS FIRST OK, AND THE SETS OF RANDOM NUMBERS
8. READER STEPS THROUGH THE TWENTY-FOUR SETS

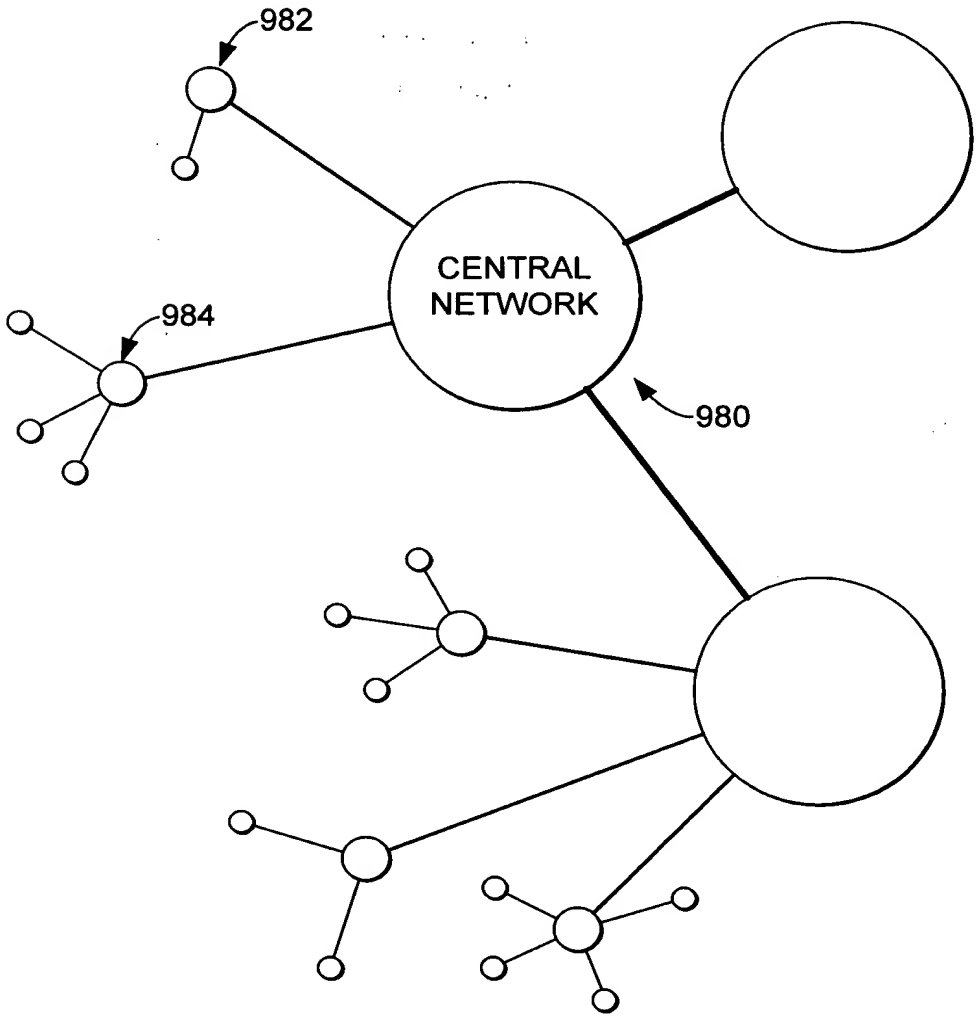
8A. READER ADDS TOGETHER SET OF ORTHOGONAL PATTERNS

8B. READER PERFORMS DOT PRODUCT OF RESULTANT PATTERN AND CARD SCAN, STORES RESULT

9. READER TRANSMITS THE TWENTY-FOUR DOT PRODUCT RESULTS TO CENTRAL NETWORK
10. CENTRAL NETWORK CHECKS RESULTS AGAINST MASTER
11. CENTRAL NETWORK SENDS FINAL APPROVAL OR DENIAL
12. CENTRAL NETWORK DEBITS MERCHANT ACCOUNT, CREDITS CARD ACCOUNT

FIG. 25

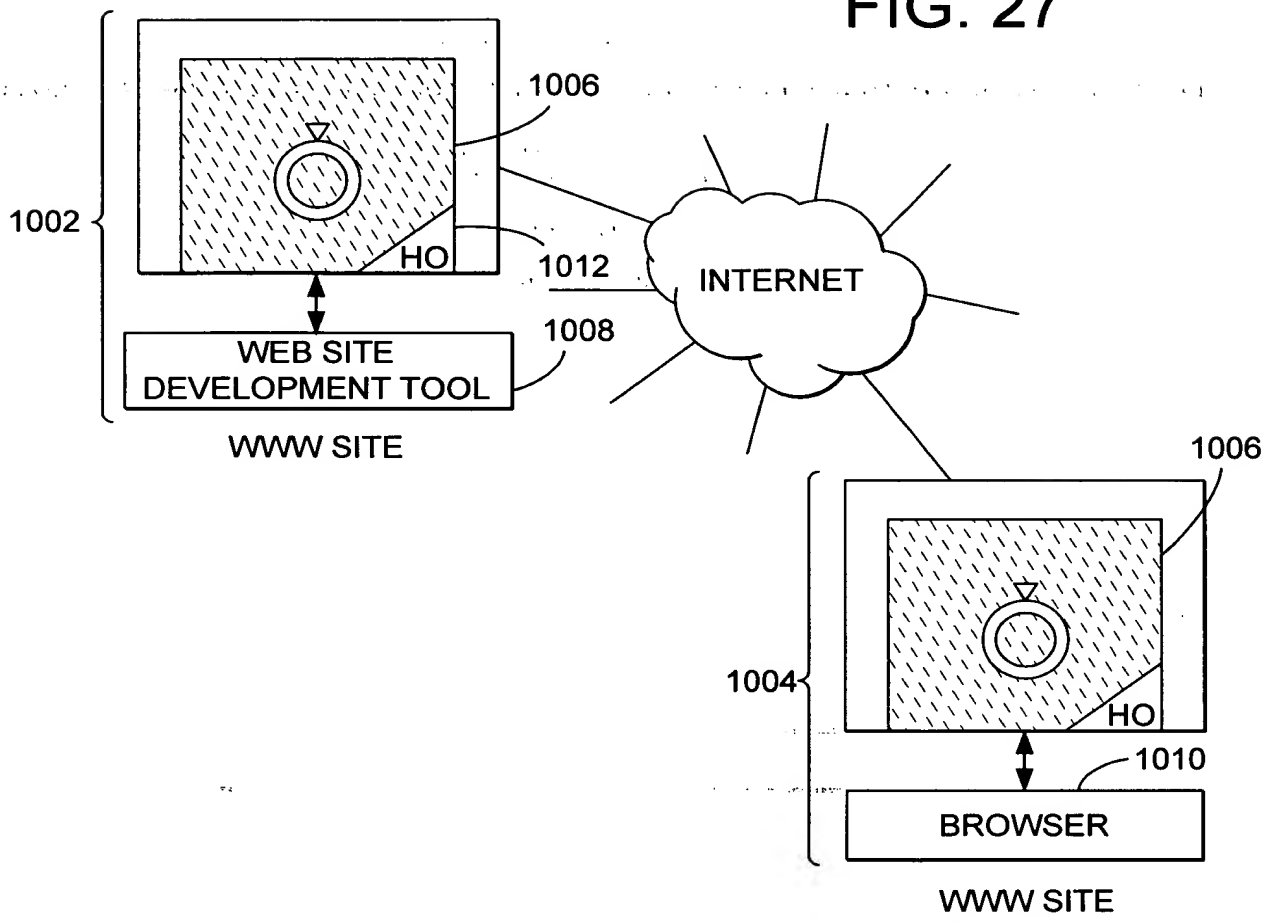
THE NEGLIGIBLE-FRAUD CASH CARD SYSTEM



A BASIC FOUNDATION OF THE CASH CARD SYSTEM IS A 24-HOUR INFORMATION NETWORK, WHERE BOTH THE STATIONS WHICH CREATE THE PPHYSICAL CASH CARDS, 950, AND THE POINT-OF-SALES, 984, ARE ALL HOOKED UP TO THE SAME NETWORK CONTINUOUSLY

FIG. 26

FIG. 27


1002
1006
HO
1012
INTERNET
1008
WEB SITE
DEVELOPMENT TOOL
WWW SITE
1006
1004
HO
1010
BROWSER
WWW SITE

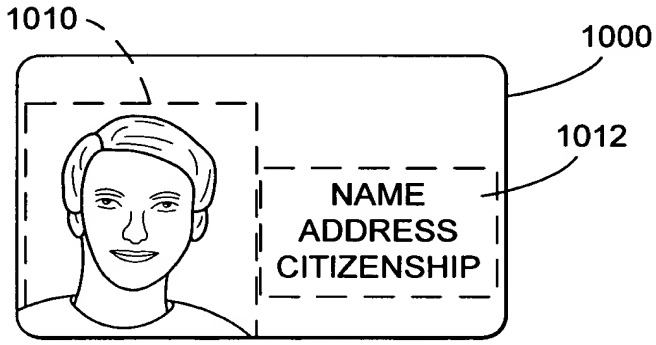

1010
1000
1012
NAME
ADDRESS
CITIZENSHIP

FIG. 28

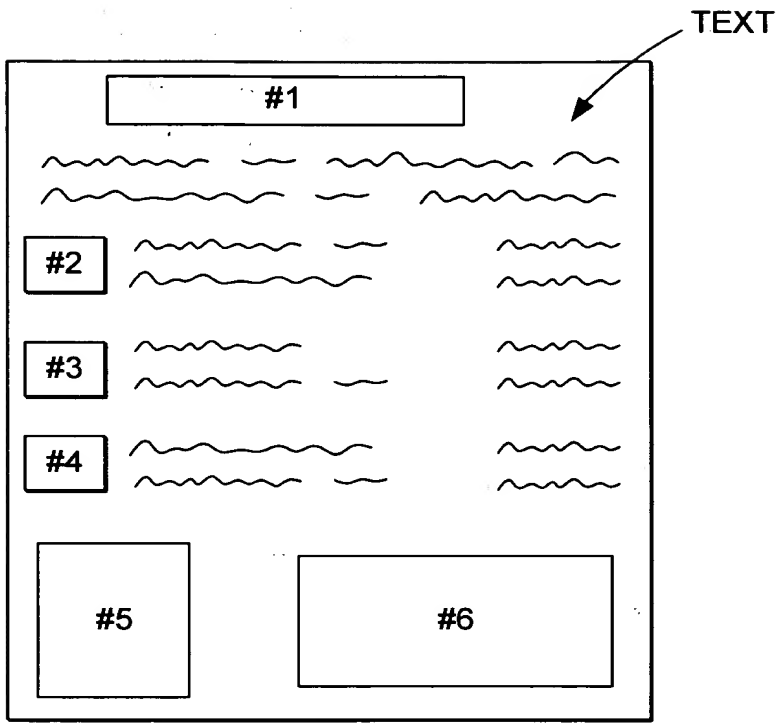


FIG. 27A

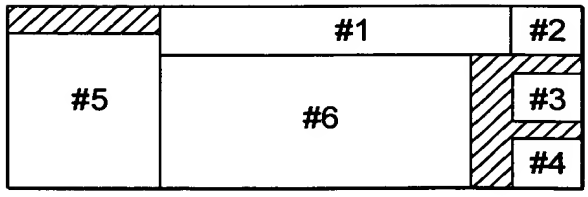
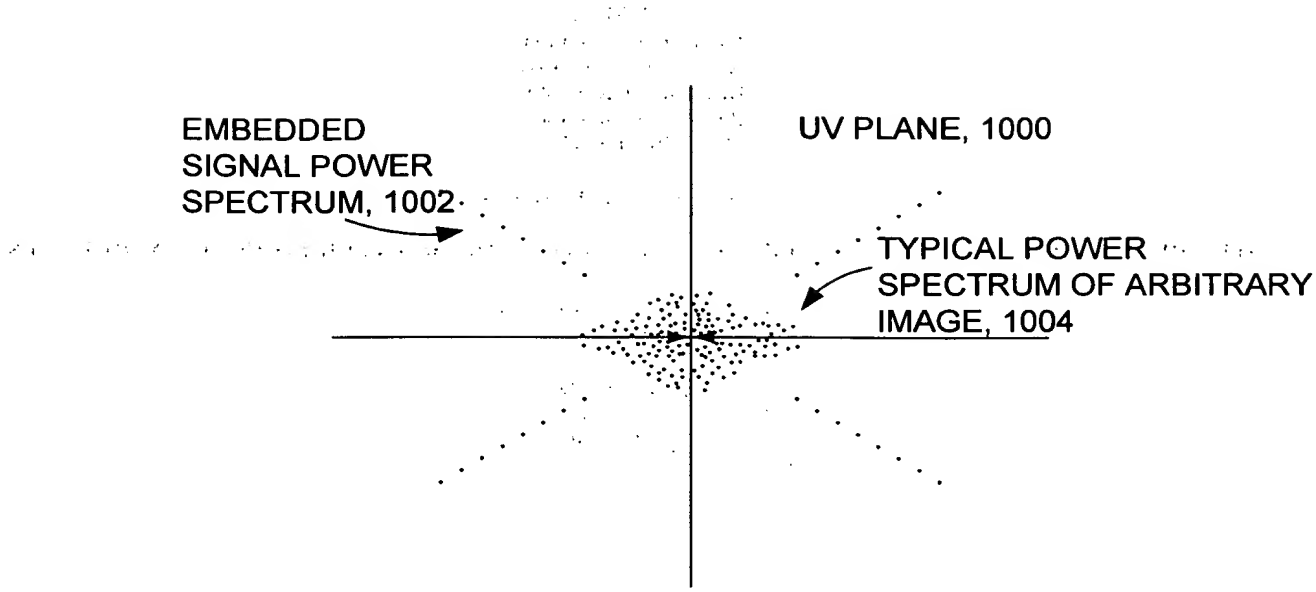
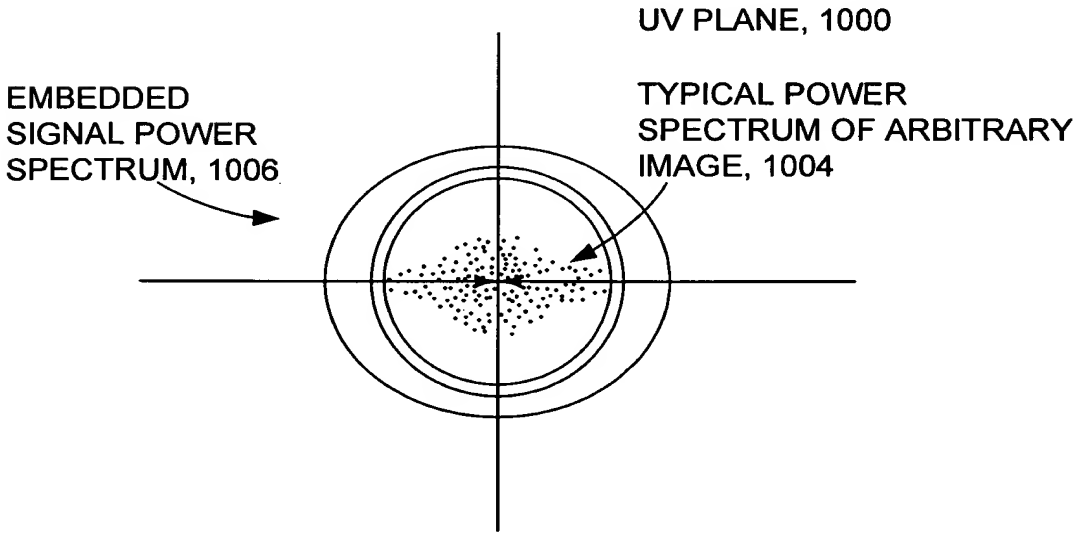


FIG. 27B



NON-HARMONIC SPATIAL FREQUENCIES ALONG THE 45 DEGREE AXES, GIVING RISE TO A WEAVE-LIKE CROSS-HATCHING PATTERN IN THE SPATIAL DOMAIN

FIG. 29



NON-HARMONIC CONCENTRIC CIRCLES IN UV PLANE, WHERE PHASE HOPS QUASI-RANDOMLY ALONG EACH CIRCLE, GIVING RISE TO PSEUDO RANDOM LOOKING PATTERNS IN THE SPATIAL DOMAIN

FIG. 30

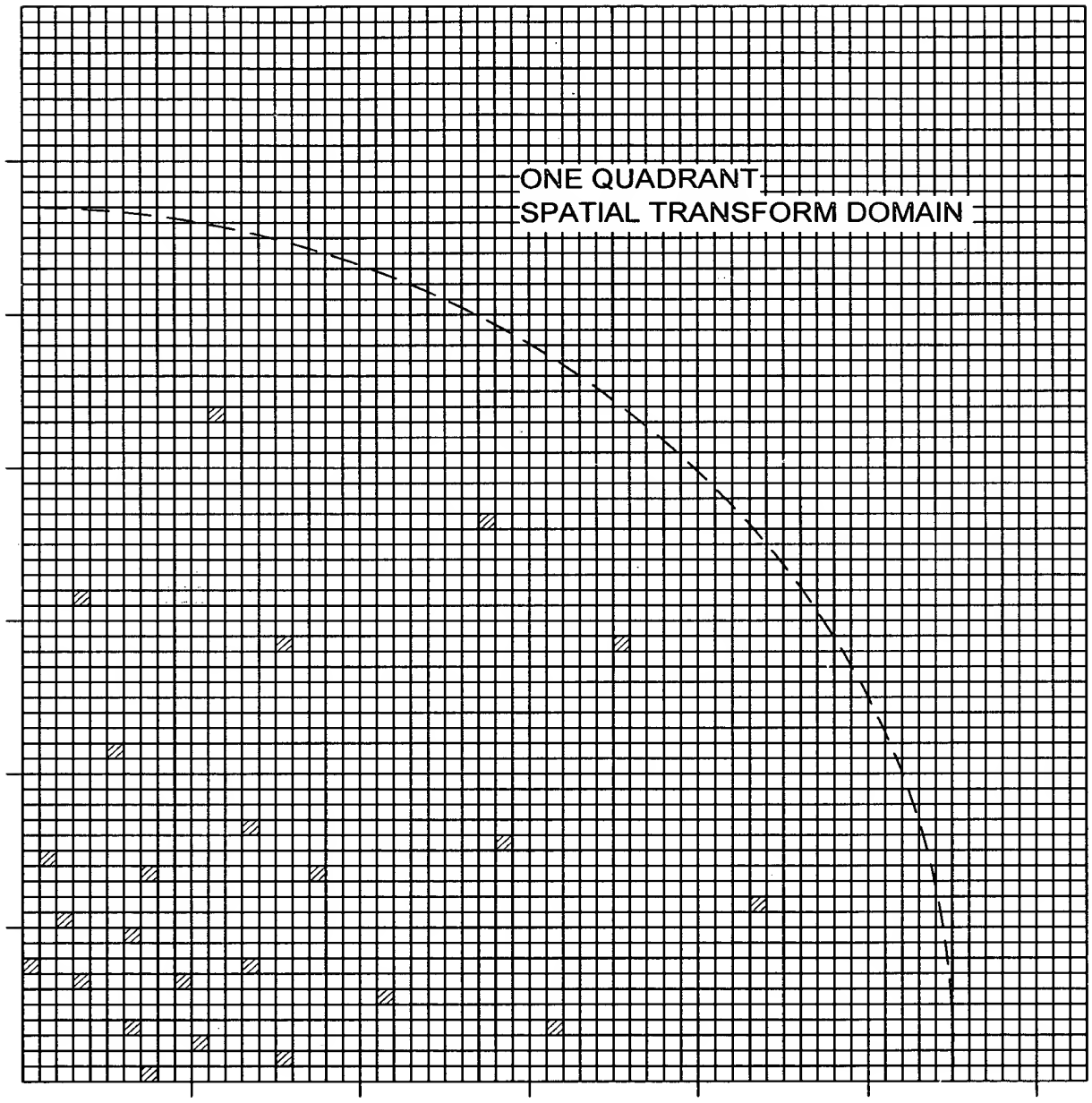
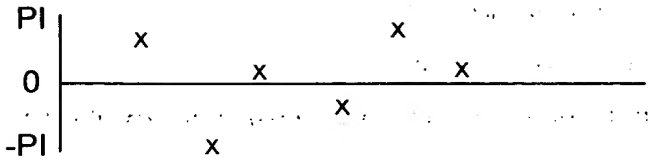
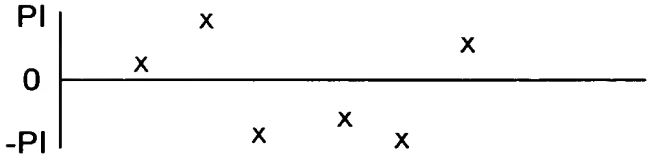


FIG. 29A



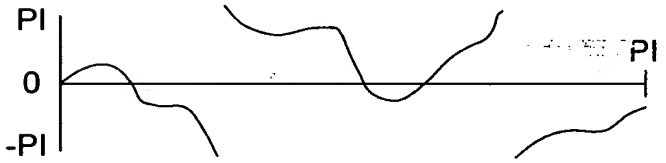
PHASE OF SPATIAL FREQUENCIES ALONG FORWARD 45 DEGREE AXES, 1008

FIG. 31A



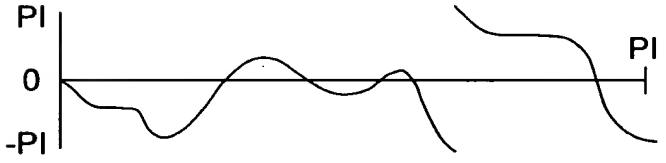
PHASE OF SPATIAL FREQUENCIES ALONG BACKWARD 45 DEGREE AXES, 1010

FIG. 31B



PHASE OF SPATIAL FREQUENCIES ALONG FIRST CONCENTRIC RING, 1012

FIG. 32A



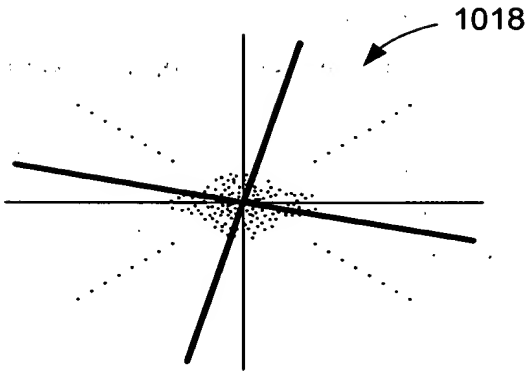
PHASE OF SPATIAL FREQUENCIES ALONG SECOND CONCENTRIC RING, 1014

FIG. 32B

PHASE OF SPATIAL FREQUENCIES ALONG THIRD CONCENTRIC RING, 1016

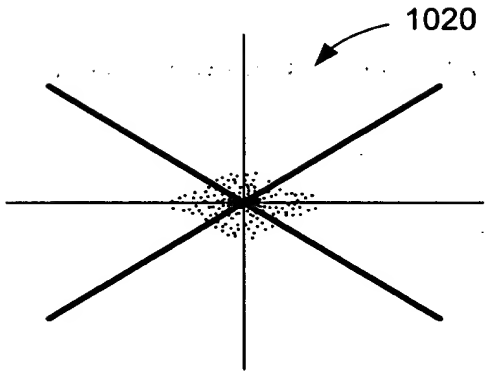
FIG. 32C

FIG. 33A



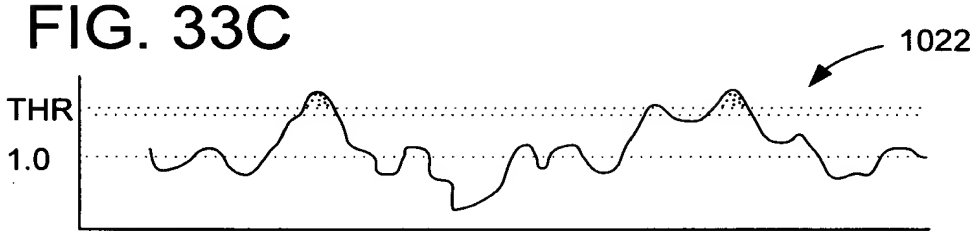
ANGLE A

FIG. 33B



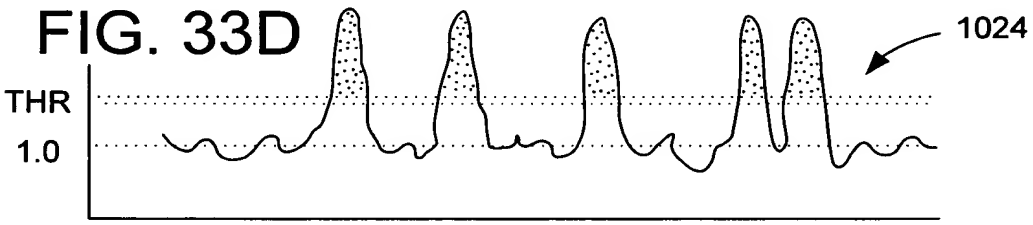
ANGLE B

FIG. 33C



POWER PROFILE ALONG ANGLE A, AS NORMALIZED BY ITS OWN MOVING AVERAGE; ONLY A MINIMAL AMOUNT EXCEEDS THRESHOLD, GIVING A SMALL INTEGRATED VALUE

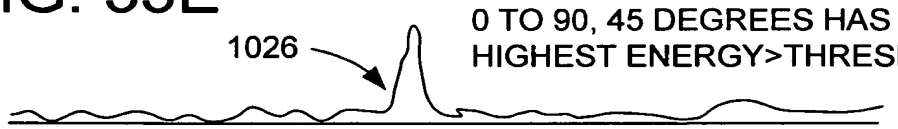
FIG. 33D



POWER PROFILE ALONG ANGLE B, AS NORMALIZED BY ITS OWN MOVING AVERAGE; THIS FINDS STRONG ENERGY ABOVE THE THRESHOLD

FIG. 33E

AS ANGLE IS SWEPT FROM 0 TO 90, 45 DEGREES HAS HIGHEST ENERGY>THRESHOLD



0 DEGREES 45 DEGREES 90 DEGREES

FIG. 34A

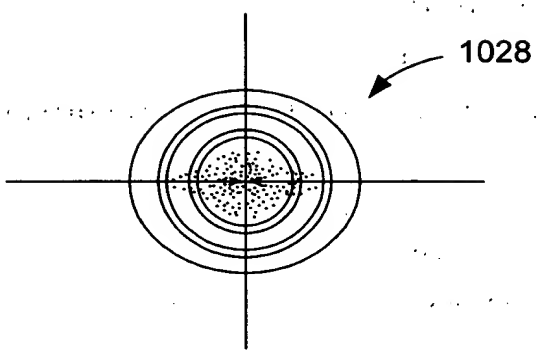


FIG. 34B

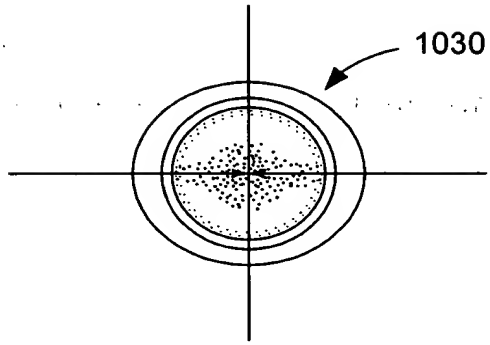
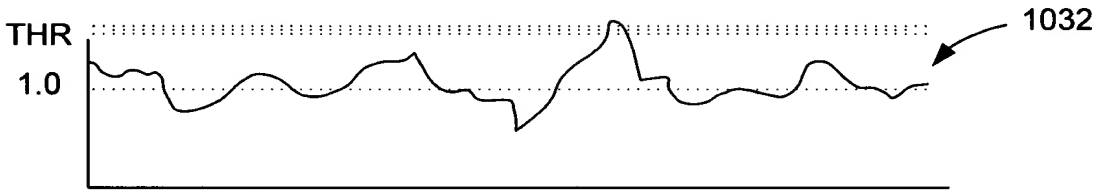
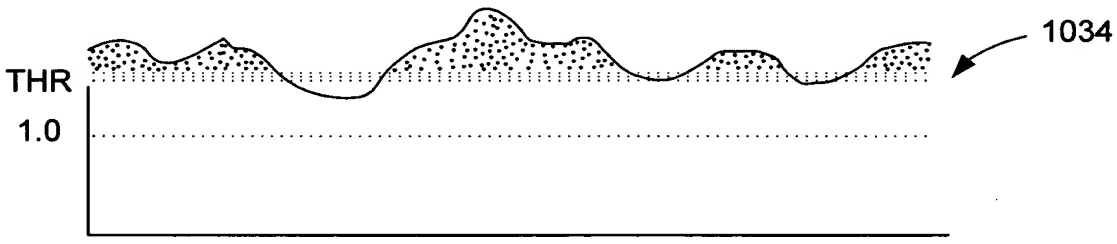


FIG. 34C



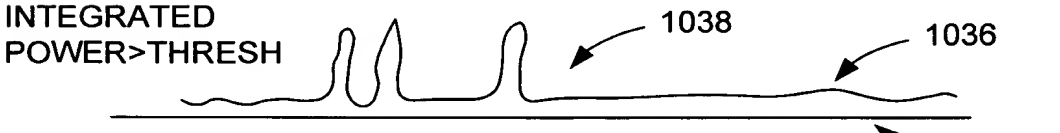
POWER PROFILE ALONG CIRCLE AT RADIUS A

FIG. 34D



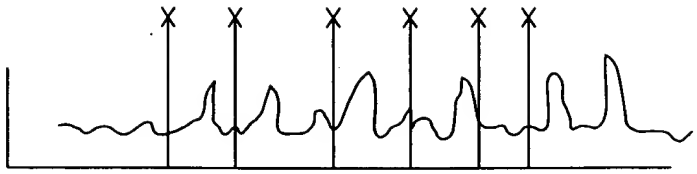
POWER PROFILE ALONG CIRCLE AT RADIUS B

FIG. 34E



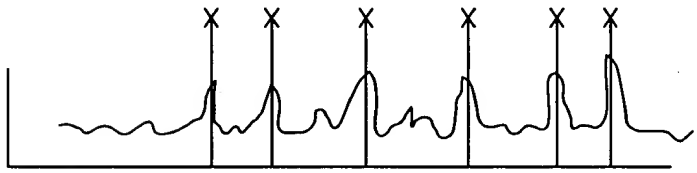
TOTAL INTEGRATED POWER ABOVE
THRESHOLD AS FUNCTION OF RADIUS

FIG. 35A



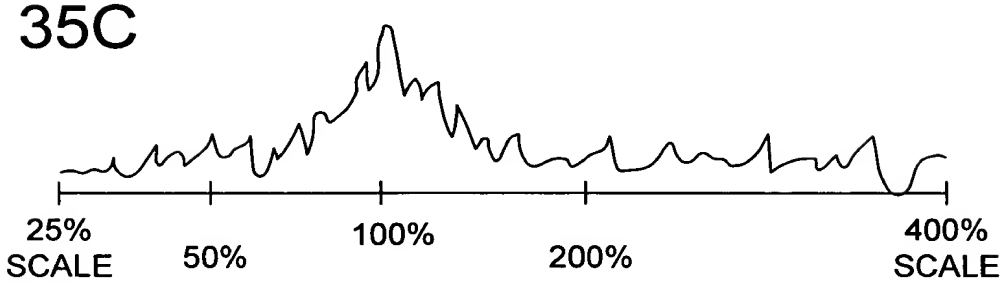
SCALE = A: ADD LL POWER VALUES AT THE "KNOWN" FREQUENCIES", 1042

FIG. 35B



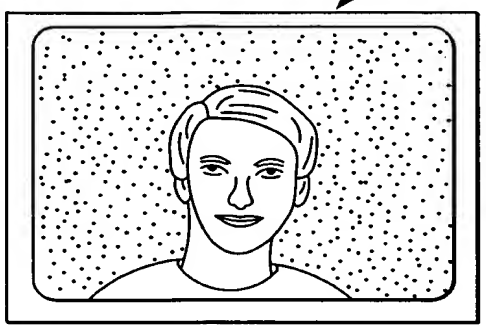
SCALE = B: ADD LL POWER VALUES AT THE "KNOWN" FREQUENCIES", 1044

FIG. 35C



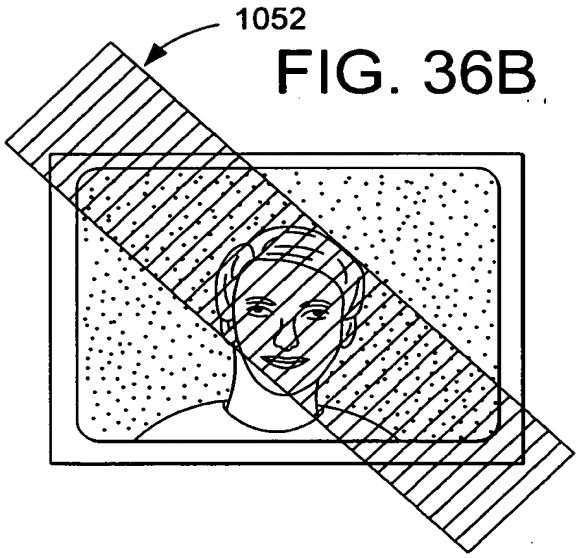
"SCALED-KERNEL" BASED MATCHED FILTER; PEAK IS WHERE THE SCALE OF THE SUBLIMINAL GRID WAS FOUND, 1046

FIG. 36A



ARBITRARY ORIGINAL IMAGE
IN WHICH SUBLIMINAL GRATICULES
MAY HAVE BEEN PLACED

FIG. 36B



"COLUMN SCAN" IS APPLIED
ALONG A GIVEN ANGLE THROUGH
THE CENTER OF THE IMAGE

FIG. 36C

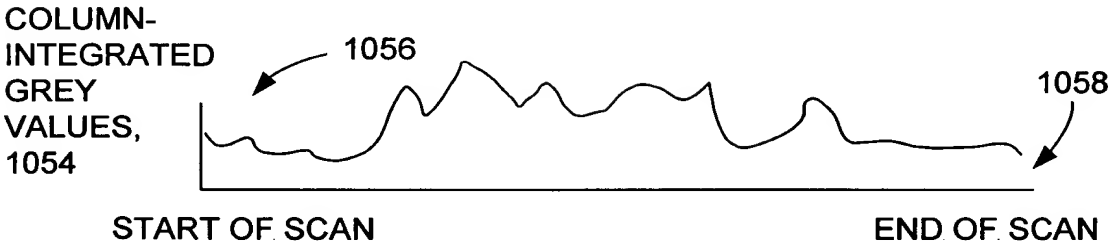
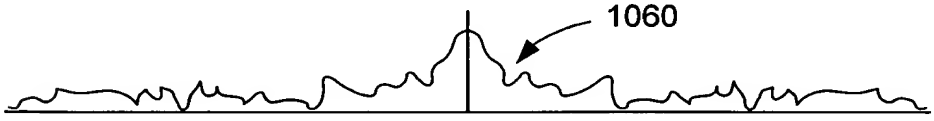


FIG. 36D



MAGNITUDE OF FOURIER TRANSFORM OF SCAN DATA

PROCESS STEPS

1. SCAN IN PHOTOGRAPH
2. 2D FFT
3. GENERATE 2D POWER SPECTRUM, FILTER WITH E.G. 3X3 BLURRING KERNEL
4, STEP ANGELS FROM 0 DEGREES THROUGH 90 (1/2 DEG)
5. GENERATE NORMALIZED VECTOR, WITH POWER VALUE AS NUMERATOR, AND MOVING AVERAGED POWER VALUE AS DENOMINATOR
6. INTEGRATE VALUES AS SOME THRESHOLD, GIVING A SINGLE INTEGRATED VALUE FOR THIS ANGLE
7. END STEP ON ANGLES
8. FIND TOP ONE OR TWO OR THREE "PEAKS" FROM THE ANGLES IN LOOP 4, THEN FOR EACH PEAK...
9. STEP SCALE FROM 25% TO 400%, STEP ~ 1.01
10. ADD THE NORMALIZED POWER VALUES CORRESPONDING TO THE 'N' SCALED FREQUENCIES OF STANDARD
11. KEEP TRACK OF HIGHEST VALUE IN LOOP
12. END LOOP 9 AND 8, DETERMINE HIGHEST VALUE
13. ROTATION AND SCALE NOW FOUND
14. PERFORM TRADITIONAL MATCHED FILTER TO FIND EXACT SPATIAL OFFSET
15. PERFORM ANY "FINE TUNNING" TO PRECISELY DETERMINE ROTATION, SCALE, OFFSET

FIG. 37